JULY
1940

TELEPHONE ENGINEER

MANAGEMENT
ENGINEERING
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FEATURES

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THIS 3/8" COPPERWELD TELEPHONE GROUND ROD WITH ANNEALED COPPER PIGTAIL COSTS ONLY 34¢*
THIS 3/8" COPPERWELD TELEPHONE GROUND ROD WITH TYPE B CLAMP COSTS ONLY . . . 35¢*
* THESE PRICES MAY DIFFER SLIGHTLY DEPENDING UPON DESTINATION

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And the low initial price is only the beginning of Copperweld economy. The thick layer of pure copper prevents rust and provides a copper-to-copper contact with the grounding wire. A Copperweld rod provides a *permanent*, safe, dependable ground.

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COPPERWELD STEEL CO.
GLASSPORT, PA.

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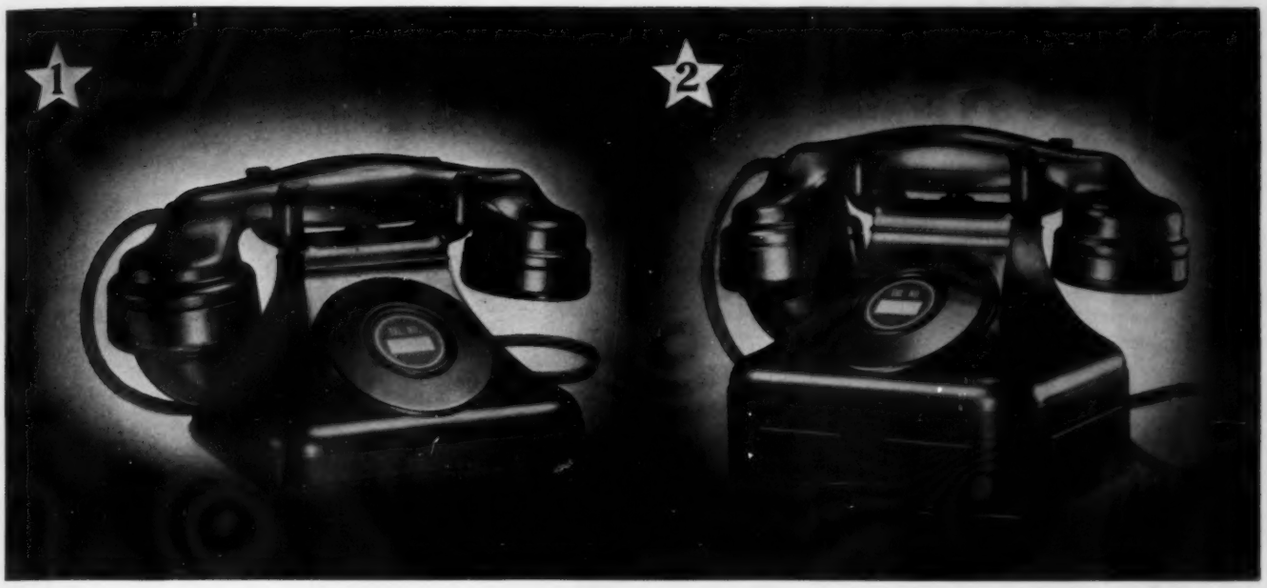
NON RUSTING GROUND RODS and CLAMPS

——— "But Now We Use Leich Handsets Exclusively"



"We've standardized on Leich Handsets" is a comment you hear with ever-increasing frequency at telephone conventions and district meetings. Originally adopted by only a few telephone men, Leich Handsets today are the preferred telephones of hundreds of operating administrations, large and small.

Nor are the reasons hard to find. First, of course, comes the performance of Leich Handsets — for their ever-growing popularity is founded on their excellent talking qualities. But once acquainted with this superior feature, telephone men quickly discover the many other advantages inherent in Leich Handset design — and only in Leich design.

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1. No. 60 Common Battery Set—Use with Std. Ringer Box - - - Price $12.75
2. No. 90 Common Battery Set—Ind. Coil and S. L. Ringer in Base - Price $17.45

LEICH SALES CORPORATION

427 W. RANDOLPH STREET., CHICAGO, ILLINOIS

In presenting the first of a new series of articles by Jay G. Mitchell we bring back to TELEPHONE ENGINEER readers one of the most popular authors that has graced our columns for the past 31 years. A telephone engineer and an author of world wide repute, Mr. Mitchell is starting his series with an article on Commercial Engineering that is "must" reading for every telephone man.

▲

The 1st issue of Fortnightly TELEPHONE ENGINEER was mailed on July 1. Evidently it "rang the bell" as every mail is now bringing new subscriptions for our magazines. There will be close to 150 new subscribers reading this column this month. Our combination subscription offer of $1 for subscription for both TELEPHONE ENGINEER and Fortnightly TELEPHONE ENGINEER will be open for only a short time.

▲

"Quizzicus" is having his headaches these days. Seems to be giving headaches to the inventors too. One of his ideas that appeared last month was subject to claims by one of our advertisers that their product filled the bill. We reproduce in this issue their letter of proof. Quizzicus is corresponding with many readers who are sending in new ideas to better telephony — so send in your ideas too — it is possible that new products are available with which you are not familiar.

TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

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CONTENTS

- Across the Editor's Desk 4
- "Tapping In" on Washington
  By Roland C. Davies 15
- Convention Dates 16
- Estimating Construction Costs
  By Jay G. Mitchell (No 1 of Series) 17
- Quizzicus Asks Questions 18
- Short Course in Telephone Transmission
  By B. C. Burden 19
- Association Activities 21
- An Analysis of Public Relations
  By Atwell Jackson 23
- "It's Odd But True" 23
- 25 Years Ago This Month 27
- Line & Desk—By Ray Blain 28
- Long Lines—By R. A. Clark Jr. 30
- Station Barometer 38
- Index to Advertisers 46

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"Tapping In" On Washington

Roland C. Davies

THE outlook for the future of the communications industry — with the telephone industry as the most vital branch—is slated to be sketched during the latter part of July in the National Capital from the standpoint of national defense preparedness and for any eventuality of war with the formation of the new Defense Communications Committee.

This Committee will become a key part of the National Defense planning after it has been created by President Roosevelt by executive order with its membership designated. Composed of the leading officials of the government in charge of communications and radio policies, representing the Army, Navy, FCC, State Department and Coast Guard, the new Defense Communications Committee as it is projected will coordinate and "weave together" the existing 'M-day" plans of the Army and Navy in a program of comprehensive consultation with all branches of the communications industry. It is emphasized that the creation of the Defense Communications Committee in no way upsets the present policy of maintaining normal and private management and operation of communications —the telephone operating companies and the telephone manufacturing companies.

There will be a number of advisory subcommittees from each branch of the communications industry to aid and cooperate with the Defense Communications Committee. The advisory subcommittee from the telephone industry will be composed of Representatives both from the Bell System and from the Independent industry. Other groups will include the wire telegraph field, radiotelegraph, cable, and broadcasting. There will also be an important government advisory technical subcommittee.

By ROLAND C. DAVIES
Editor
Telecommunications Reports

THE membership of the Defense Communications Committee was slated to be made up of the following officials who are key figures in that field: FCC Chairman James Lawrence Fly; Major General Joseph O. Mauborgne, U. S. Army Chief Signal Officer; Rear Admiral Leigh Noyes, Director of the Office of Naval Communications of the U. S. Navy; Thomas Burke, Chief of the Division of International Communications of the State Department and Commander Joseph F. Farley, Chief Communications Officer of the U. S. Coast Guard. The Coast Guard operates a large number of radio stations and also owns and operates several thousand miles of telephone and telegraph cable.

The Defense Communications Committee will survey the entire field of communications and broadcasting and will study the best means of coordinating all of the facilities and different media of communications after considering each service and all types of needs in the light of the best interests of the nation. It will bring up to date and will revise the Army and Navy plans for communications usage in war time as weighed in the scale of current European war developments. Every branch of communications—telephone, telegraph, cable, domestic and international radio communications, radio services such as aviation, amateur, police, emergency etc., and broadcasting—will be studied with the goal of fitting each service into the national defense picture in its proper niche and to discard non-essential services so that wires or radio frequencies can be put to better use for defense needs.

There are three major objectives for the planning of the Committee. First, to determine just what communications facilities are necessary and must be made available—both wire and radio—for armed defense needs of the military and naval forces. Second, what communications services are essential for the proper functioning of the industries that supply the defense needs of the armed forces, that is the armament and munitions industries etc, and in the case of broadcasting what radio facilities should be used by the government for official announcements to keep up the public morale. Third, the amount of communications facilities and broadcasting services which should be retained to fulfill the requirements of the civilian population in time of war.

THE telephone industry is exceptionall well geared for national defense necessities and the Army and Navy authorities have been maintaining a close cooperation and liaison with both the Bell System and the Independent industry to work out defense problems and plans for war requirements. An initial phase of the projected Defense Communications Committee's work, however, will probably be to study the needs to fill any gaps in the wire communications facilities in relation to military needs in war time. This may result in considerable planning on wire construction for military usage in sparsely settled regions where normal peace time needs do not require substantial facilities and undoubtedly may mean much rehabilitation of antiquated farmer lines. This latter phase is important, especially, for the Independent industry to follow in observing its developments.

Although Congress has appropriated or authorized billions of dollars for national defense, and most of it will be for naval strength, airplanes, mechanized equipment etc., the Army Signal Corps and Naval Communications will receive several score of millions of dollars for communications apparatus of which a substantial amount will undoubtedly be allocated to new telephone equipment. However, so that their procurement of essential items of telephone equipment will be efficient and economical, the Army and Navy authorities have been extremely careful in the formulation of their budgets and have not yet broken down into detail the different types of telephone apparatus and equipment items which will be sought from the various manufacturers.

At the FCC the major activity in national defense was in creating a comprehensive nationwide field inspection force to patrol the radio spectrum in order to prevent wireless espionage and fifth column activities. The Commission will place a staff of nearly 500 inspectors and clerks in the field and will add 100 fixed detector stations and as many portable direction finder stations on trucks to its present system of 7 monitoring stations which likewise will be increased to 10. This will cover every state in the Union, all territories and possessions. In addition to patroling the radio ether, the field inspectors are to examine the American citizenship and fingerprint the licensed radio operators of the country—amateurs and commercial—who number around 100,000. A move has been started by the FCC to inquire into the proof of American citizenship of wire and cable operators, which would include telephone employees, just as is being done in the case of the licensed radio operators. The first idea is to have the companies obtain the American citizenship proof from the telephone and telegraph employees on a voluntary basis, but if this is not feasible the FCC because it does not now have the statutory power will seek such authority from Congress and then will itself as a governmental agency undertake to probe the citizenship qualifications of the wire carriers' employees.

Convention Dates

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 24 and 25.

South Dakota Telephone Association, Sioux Falls, October 3 and 4.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 15, 16, 17 and 18.

Independent Pioneer Telephone Association, Hotel Stevens, Chicago, October 17.

U. S. Independent Telephone Association Presents Strong Arguments on Learner Operator Wage Exemption

CITING that the Independent telephone industry has a high reputation in the treatment of its employees, the Wage-Hour Committee of the United States Independent Telephone Association in its brief supporting the review of the learner operator wage exemption order by the Wage and Hour Division stressed that the evidence is overwhelming for a longer period of operator training that the alloted 320 hours time and that a lower rate of pay than the 25 cents per hour wage should be established. Henry T. Hunt, Wage and Hour Division Principal Hearing Examiner, is now reviewing the case and it is believed that he is considering the aspects of future curtailment of employment opportunities from mechanization if the engaging of learners is reduced as a major factor. This may presage a favorable revision of the order for the Independent industry with a lengthening of the training period and possibly a scaling down of the wage rate, although the latter step would meet the hardest opposition within the Division and from the labor unions.

The Wage-Hour Committee of the Independent Telephone Association in its brief declared that the government agency and Wage-Hour Administrator Fleming should modify the March 30 order to provide for a longer training period and a lower learner wage rate "in the interest of the operators themselves, the public and the Independent telephone companies." It was stressed that there was a complete lack of evidence in the hearing record to sustain the wage rate of 25 cents an hour and the training period of 320 hours.

The brief declared that during the discussion of the Fair Labor Standards Act it was repeatedly stated by many members of Congress that the statute was not to apply to the telephone industry and this was exemplified when Congress enacted the exemption for telephone exchanges with less than 500 stations. "These evidences of the political background of the Act should not only be noticed by the Administrator," the brief stated, "but in dealing with the Independent telephone industry and

(Please turn to page 33)

Quizzicus Gets a Reply

July 1, 1940

Quizzicus
c/o Telephone Engineer
7720 Sheridan Road
Chicago, Illinois

Dear Quizzicus:

I see by the papers (Telephone Engineer of June 1940) that you are wondering why someone doesn't invent "a small conductor type drop wire to be supported by a steel or iron wire attached to or enclosed within the outer braid covering". Perhaps thinking up these questions keeps you so busy that you can't find time to read the advertising pages of your own publication. Why not take a look at them sometime: they tell an interesting story of modern products developed for modern telephone construction.

For instance, Copperweld Drop Wire exactly fits the requirement of the product that you hoped someone would invent. Only we go a little further than your idea suggested. We not only enclose the high strength steel wire within the insulation but also enclose it within a heavy copper covering.

Copperweld Drop Wire combines the strength of steel with the rust-resisting life and conductivity of copper. The breaking strength of each No. 17 wire is 200 pounds—400 pounds total breaking strength for both conductors. If you'd like to see a sample of this drop wire which you hoped someone would invent just drop me a line.

Yours very truly,
(signed) W. J. McIlvane
Sales Promotion Manager
Copperweld Steel Company

ESTIMATING

Construction Costs

By JAY G. MITCHELL

In this, the first of a series of articles by Jay G. Mitchell, the author discusses a subject that has been neglected somewhat by telephone publications during the past few years. Commercial Engineering is becoming more important each year and we suggest you file each issue containing Mr. Mitchell's writings for future reference.

Commercial Engineering

IN THE Public Utility industry there are many types of executive ability participating in the manifold activities contributing to the conduct of the enterprise. In the nominal Engineering Department the task may include only the physical operation of the plant but in such cases there is always another branch of engineering, often unknown as a distinctive department, which is fully as important. This is the engineering which has to do with the costs of plant, the conservation of revenue, the elimination of avoidable operating expense and the many other economic factors wholly or partially beyond the horizon as far as other executive departments are concerned.

This is a most important division of the engineering activities of any public utility and in the field of the communications industries it is coming to be known as Commercial Engineering. Several of the large operating combinations in the telephone industry, for instance, have recognized the distinctive character of this type of activity and have, in some cases, established separate departments each with its own personnel to carry on such work. In **any** telephone company large or small there is some of this sort of work to be done and the most accurate methods are always of value in the current management of the utility.

Estimates of Cost

WHETHER the utility is progressive to the point where its expenditures for any purpose are budgeted in advance for executive consideration or not it is almost essential that accurate estimates of the cost of proposed new construction be made. It is not sufficient, in the author's opinion, to ask some neighboring utility in the same line of business to make up an estimate as a matter of neighborly cooperation. An estimate so made **must** reflect the experience of the neighboring utility as to wage rates, overheads and loadings and only through very unlikely coincidence will it truly set out the costs properly to be anticipated by the owner of the proposed new construction. It is so common a condition as to require no substantiation that the dollar costs for identical construction operations vary widely among different utilities even though it might appear, on superficial observation, that conditions were identical in them all. The desirable thing to be attained is that the actual cost to the utility which is to do the work be predetermined for executive consideration and that the completed project disclose a total cost in reasonable accord with the estimate.

In passing it may be stated for record purposes that this is totally unrelated to any object which may be attained by the reduction of plant costs to average figures. In some large operating units it is now customary to divide the total number of poles, for instance, into the book figure for poles at the end of the accounting period and to retire such poles as were withdrawn from service during the previous accounting period at the average figure so obtained. Without commenting on the accuracy and value of this method for some purposes it should be obvious that any such average cost could not be utilized, without danger of grave error, in predetermining the pole cost of a given new construction project.

One reason for this is found in the fact that such an average cost figure represents all kinds of poles in the utility's plant. Within the economic life of existing pole lines fashions in construction have changed and other kinds of timber have been used for poles and new construction of today cannot disclose the same costs, except by coincidence, as the average of such construction costs for past years would show. In other words many fifty foot cedar poles were common a few years ago but almost none are being set now and an average plant pole cost of today based on accumulated book costs would reflect the included cost of many such poles and, if used for present construction estimates, would distort the result to such an extent as to render it inaccurate and misleading.

Construction Estimates

THESE considerations have obtruded themselves many times on the attention of those charged with estimating construction costs in advance. Laborious compilations of detailed dollar cost figures have been made for reference use only to become obsolete in a very short time because of the constant change in many of their component ele-

ments from day to day. Completed projects evinced a disposition to overrun authorized estimates and the accurate budgeting of routine construction operations became difficult. By careful checking of completed construction costs against estimates there was gradually developed a knowledge of the variation limits and the application of the proper correctives to the estimates resulted in great improvement.

In the twenties the great number of rate adjustment proceedings which were filed with the regulatory authorities required the determination of Reproduction Cost New in many cases. The determination of the Reproduction Cost New as of a date certain for a given telephone utility is much simpler than the determination of an Historical Reproduction Cost New although the methods used are precisely the same. In both cases it became necessary to evolve methods of procedure which would be able to withstand the most expert and often most hostile analysis. Methods which were accurate as to the results obtained but which were not easily sustainable could not be used as the source of figures which did not actually represent the experience of the utility.

Labor Relatives

To simplify all cost estimating the plan of reducing direct labor plant costs to a matter of **man-hours** for each unit of plant was developed on the assumption that standard methods of construction would disclose that the same number of man-hours were required for a given operation when performed under the same or approximately the same conditions. For instance consider the setting of a twenty five foot Western Red Cedar Class 4 pole in **ordinary loam.** This operation may be divided into the following elements:

Digging (Light, Hand)
Erecting (Depends on Weight of Pole)
Lining (Depends on Weight of Pole)
Tamping (Depends on Size of Pole and size of Hole)
Shifting (Depends on Weight of Pole and Distance Shifted)

Many other divisions of the labor may be made, in fact the list given is a list of consolidated components, but with the classification shown a division of the labor according to wage rates may be made. By this means the final extension of the costs into dollars and cents is correctly made and properly weighted for classes of workmen and their wage rates. For the type of pole mentioned the man-hours required for the direct labor of setting appear to be about as follows:

	Light Digging	Hard Digging	Rock Digging
Digging (Hand)	1.927 m.h.	3.475 m.h.	6.950 m.h.
Erecting, Lining, Tamping, Shifting	1.413 m.h.	1.413 m.h.	1.413 m.h.
Total Man-hours	3.340	4.888	8.363

Obviously in an organization where the weighted average wage rate for linemen is $0.80 per hour and for groundmen is $0.60 per hour, for illustration, the direct labor cost, wihout any loading or overhead, of setting twenty-five foot Western Red Cedar Class 4 poles would be:

Under conditions requiring Light Digging	$2.2866
Under conditions requiring Hard Digging	3.2154
Under conditions requiring Rock Digging	5.3004

It must be emphasized that these figures are to be added to the other costs, including loadings, incidental to poles in the plant such as Material, Construction Loss, Hauling, Railroad and Truck Freight, Stepping, Painting, Cribbing, Extra Gaining and so on in order to arrive at the total cost. To the total cost of units of plant must then be added the overhead. If, in a given plant, the twenty five foot Western Cedar poles are set in locations where the character of the soil is such as to require the kinds and relative amounts of each kind of digging shown below then the weighted average labor cost of setting a twenty five foot Western Cedar poles is determined as follows:

Light Digging	60%	$137.196
Hard Digging	35%	112.539
Rock Digging	5%	26.502
All	100%	$276.237
Weighted average labor cost per pole		2.762

The slightest consideration of this illustration discloses this interesting fact. If the utility in question retires enough twenty five foot Western Cedar poles in the locations requiring light digging so that the entire plant includes only 40% in such places and sets enough of the same kind in the locations requiring hard digging so that the entire plant now includes 55% in such places the weighted average labor costs, assuming no change in wage rates, will be as follows:

Light Digging	40%	$ 91.464
Hard Digging	55%	176.847
Rock Digging	5%	26.502
All	100%	$294.813
Weighted average labor cost per hole		2. 948

With the same total number of poles and with the same rates of wages the labor cost of the average twenty five foot Western Cedar pole in this imaginary plant has **increased** from $2.762 to $2.948 solely due to the shifting of the location, by retirements and addi-

(Please turn to page 34)

I WONDER WHY SOMEONE DOESN'T INVENT

by Quizzicus

An odor for nitrogen gas so that when used for cable testing, leaks may be more easily detected and located.

A gas tight cable terminal in order that exchange cables may be maintained under gas pressure.

A telephone equipped with a self-contained visual as well as an audible signal.

An electric duct rodding outfit consisting of a small catapillar tractor tread and powered by an electric motor that will pull a cord with power wires inclosed to supply current to the motor.

An all metal butt step for a pole to replace the present commonly used wooden variety.

A properly bushed clamp to hold a splice in aerial cable to the messenger strand.

(Quizzicus is anxious to have YOUR suggestions on products that will make your job easier and improve the telephone art. Address your suggestion to Quizzicus c/o TELEPHONE ENGINEER.)

Short Course in Telephone Transmission

By
B. C. BURDEN

Subject: Carrier Telephone Circuit Filters

—Continued from June Issue—

General

IN PREVIOUS articles of this series dealing with carrier telephone circuits, various types of electrical filters have been shown in the carrier circuit. These filters perform a vital function in carrier systems and their importance justifies a more complete treatment of their general theory and characteristics.

Filters are used, not only in carrier systems, but also in connection with repeaters, in some power supply arrangements, and are even made use of in suppressing radio frequency interference from telephone dials. An electrical filter is an arrangement of capacity and inductance connected into a circuit in such a manner as to offer maximum impedance to some frequencies and minimum impedance to others. It is this ability of filters to select or reject some pre-determined frequency or range of frequencies that makes them a vital part of a carrier telephone system.

In carrier telephone systems it is necessary to separate at each end of the line the voice and carrier frequencies. By the use of filters this is easily accomplished. Likewise in order to super-impose more than one carrier channel on a single pair of wires it is necessary to use selective filters which will permit various carrier channels to operate without interference with each other.

Filter Phenomena

A FILTER is dependent on the peculiar properties of an inductance and capacity when associated together in a series or a parallel circuit. If a capacity and an inductance are connected in series there is a **critical frequency** at which the reactance of the inductance will exactly neutralize the reactance of the capacity as under this circumstance, the inductance and capacity are said to be resonant and the current which will flow through them will be dependent entirely on the resistance of the circuit. In other words, a series combination of inductance and capacity will offer minimum impedance to the resonant frequency current. If the inductance and capacity are placed in parallel at some critical or **resonant frequency** the combination will offer maximum impedance to the flow of current through the combination. In a series resonant circuit the frequency at which resonance or a maximum current will flow can be computed by the following simple equations:

$$fr = \frac{1}{2\pi\sqrt{Lc}}$$

When:

fr=resonant frequency in cycles.
L=inductance in henries.
C=Capacity in forads.

The same formula also applies to parallel resonant circuits provided there is no resistance present. If resistance exists the circuit formula is slightly more complicated.

From what has just been said, it might seem that the combination of a capacity and inductance in series with a circuit serve as an adequate filter to permit some frequencies to pass and to reject others. It is true that such

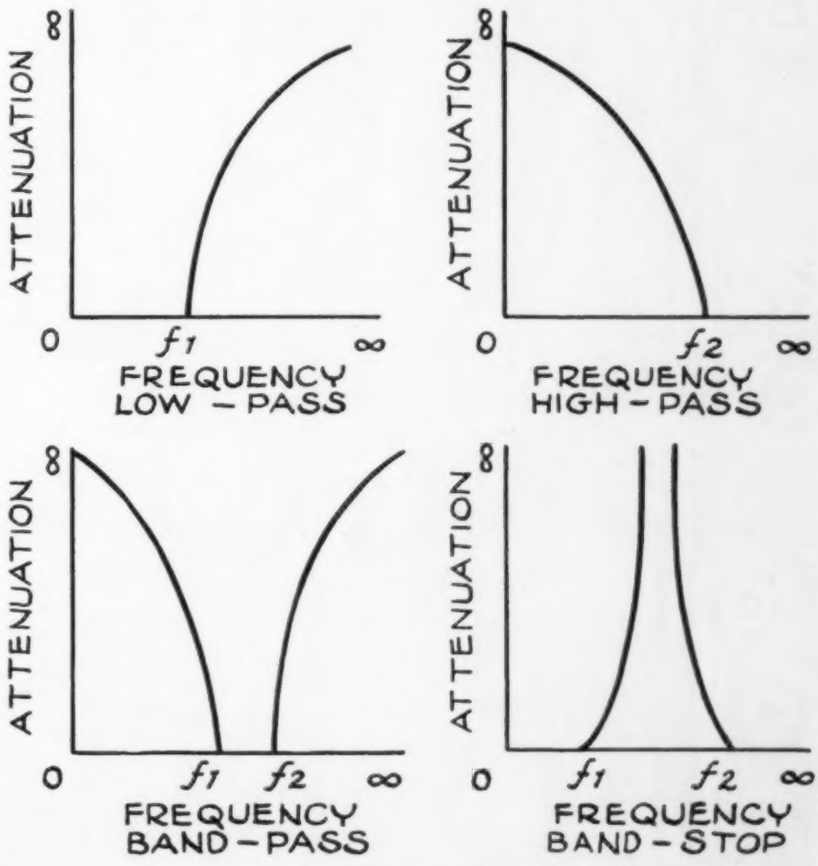


Fig. 1—Four Types of Filters

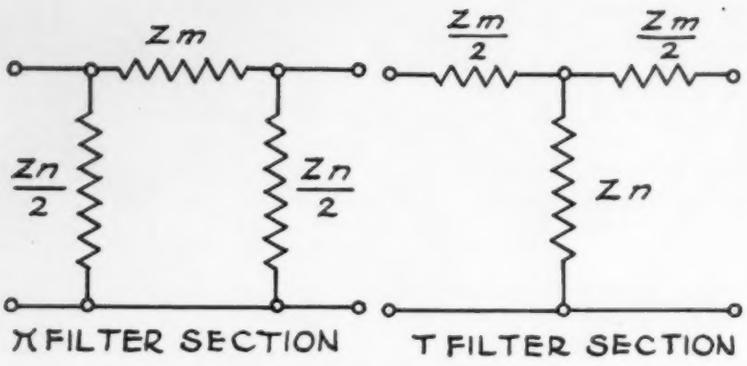


Fig. 2—Two Basic Kinds of Filter Sections

an arrangement would offer minimum impedance to the critical frequency and a greater impedance to frequencies either above or below the critical frequency, however, this simple arrangement is not adequate for most filtering applications and a more complicated filtering arrangement is necessary.

By the combination of several of the filter elements, filters having any desired degree of "sharpness" can be arranged.

Types of Filters

THERE are four basic types of filters used in telephone and radio work, namely, (1) a **low pass filter** which transmits frequencies from zero up to some pre-determined frequency but which greatly attenuates frequencies above this critical frequency. (2) The **high pass** filter which offers little or no attenuation to frequencies above some critical value but greatly attenuates frequencies below the critical frequency. (3) The **band pass filter** which passes frequencies between two limits but offers maximum attenuation to frequencies outside of this range. (4) The **band stop filter** which attenuates frequencies within a given range but passes with little or no attenuation frequencies outside of this range.

The attenuation characteristics of the four types of filters are shown in Figure 1. It will be observed that attenuation is spotted on the vertical axis and the frequency on the horizontal axis.

Filter Characteristics

A FILTER is usually placed in a telephone circuit to offer high impedance to some frequencies and low impedance to others. The ideal filter would be one which would offer zero impedance to the desired frequency and infinite impedance to the undesired frequencies. However, because of the fact that condensers and inductance coils have some resistance the practical filter falls short of meeting these ideal requirements. However, a well designed filter is capable of being able to differentiate between frequencies surprisingly close together.

An electrical filter, like other types of telephone equipment, has a **characteristic impedance** and when placed in the transmission circuit the impedance of the filter must be such that it matches the impedance of the line, otherwise there will be substantial reflection losses because of the mismatched impedances. The characteristic impedance of a filter which has symetrical elements is computed as follows:

$$Z = \sqrt{Zm\ Zn}$$

Where: Zm=series element
Zn=shunt element

If the characteristic impedance of a filter is to be independent of the impressed frequency the respective impedances of the series and shunt arms must be in inverse portion to each other. This type of filter is referred to as a **constant K** filter and is one of the simplest types. If the impedance of a filter is to be independent of frequency inductance must necessarily be used in one arm of the filter section and capacity in the other. It should be noted that there are two basic kinds of filter sections, namely, the **pi filter section** and the **T filter section.** These are shown in Figure 2. Under most circumstances the two kinds of filter sections will produce about the same results, however the T type is the more commonly used.

Design of a High Pass Filter

AS has previously been stated, the **high pass filter** is one which offers maximum attenuation to frequencies below some critical value and minimum attenuation to frequencies above the critical value. A typical example of a high pass filter is the one used at the junction point where the carrier channel connects to the voice frequency circuit. The high pass filter in the carrier channel effectively bars voice frequency currents from getting into the carrier apparatus, yet permits the carrier frequencies which are above the critical frequency to pass into the carrier equipment.

800 Cycle Filter Design

Let us look at some of the simple types of filters of the single section type and see how the inductance and capacity elements are determined. Let us compute the value of inductance and capacity required for a **T section** which is designed to operate on a 500 ohm line, and having a **cut off frequency** of 800 cycles. That is, the filter should offer minimum attenuation at frequencies above 800 cycles and maximum attenuation to frequencies below this value. The inductance Ln for the shunt element is computed by the following equation:

$$Ln = \frac{K}{4\pi f_2}$$

Substituting the values given, we find that the shunt element should be an inductance of .05 henries as shown in

(Please turn to page 39)

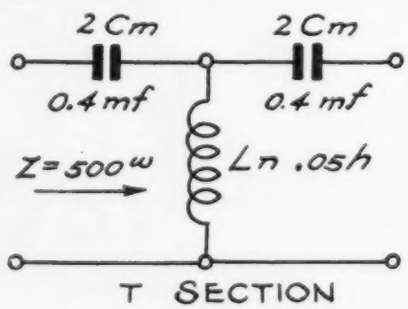


Fig. 3—800 Cycle Hi-Pass Filter

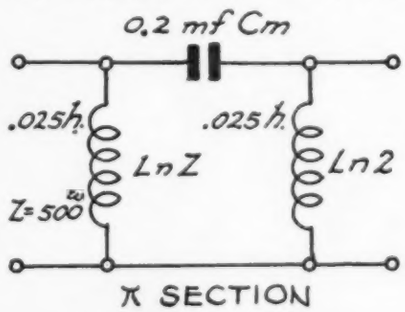


Fig. 4—800 Cycle Hi-Pass Filter

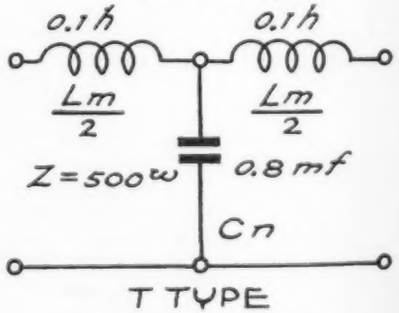


Fig. 5—800 Cycle Lo-Pass Filter

Association Activities

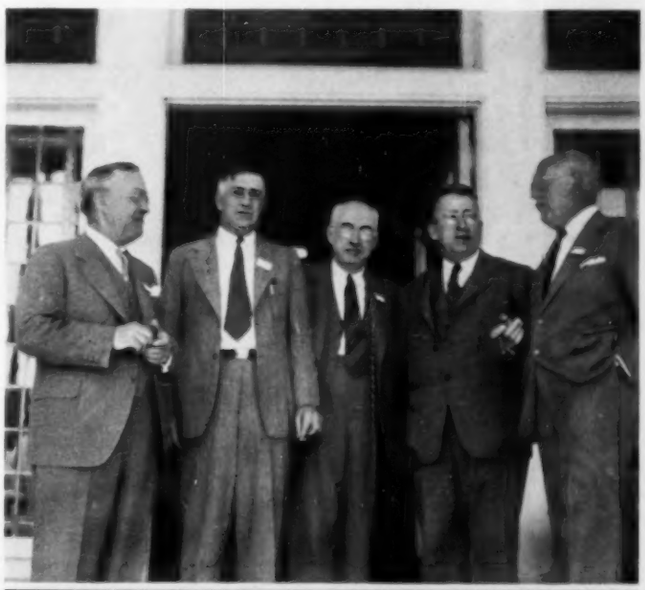
CALIFORNIA CONVENTION

"Industry as a whole is in a position to take great strides toward recovery if there is an end to further experiment and uncertainty through over-regulation by the government and abuses by union labor leaders" said President Mason of the California Independent Telephone Association in his annual address to the largest group ever assembled at the convention of the Association at the Hotel Miramar in Santa Monica on June 19 and 20, pointing out Henry Ford's recent statement that he can produce 1,000 planes a day "if the politicians will let him." Continuing, Mason urged American business to "adopt a belligerent attitude and organize to fight its battles with every honorable means at its disposal." He warned against a "grave danger that attempts will be made to create political capital out of an emergency which has no place in partisan politics."

Of importance too, was the selection of Robert E. Bennett, as full-time secretary of the Association, to relieve their long time secretary, Ernest Irwin, general agent, Associated Telephone Company, Ltd., who will continue to serve as engineer that he might be available for consultation in connection with enlarged Association activities. The Nominating committee in announcing this move stated: "We feel that more responsibility in the direction of Association affairs should be assumed by the smaller companies in order that it might become their Association without any suspicion that it is being dominated in any way by the larger companies."

Noted speakers addressing the meeting were: Irvin Cobb, a director of Associated Telephone Co., Ltd.; Mr. Mason; Mr. Irwin; James S. Campbell, treasurer of the Association; Louis Pitcher, executive vice president of the USITA; J. R. Kellems; Ray C. Wakefield, California Railroad Commission; Dean Smith, Public Relations Supervisor, Southern California Tel. Co.; Harry W. Hitchcock, Chief engineer of the Southern California Tel. Co.; Eliot H. Cheadle, Vice president of the Associated Tel. Co., Ltd.; who discussed toll revenues; Dean Barnes, general plant engineer of Associated Telephone Co., Ltd, discussed long span construction; Neal Archer and George C. Wright, also of Associated, and Ray Harper, Consolidated Telephone Co.

As a result of the election of directors and officers, Mr. Mason, who is president of Associated Telephone Company, Ltd., was reelected president, for the sixth consecutive time; Wm. DeCar-



TOP—l. to r.—Louis Pitcher, B. E. Hart, Ernest Irwin, G. B. Foscue and C. F. Mason, who was again selected to lead the California Association.

Robert E. Bennett, selected as full-time Secretary of the California Association

BOTTOM—l. to r. — Orrin Gallup, manager, Colsolidated Tel. Co., Whittier; A. Wardman, president of Consolidated, Whittier; A. N. Johns, vice president, California Water & Telephone Co., San Francisco; A. B. Fry, telephone and telegraph engineer, Calif. Railroad Commission, San Francisco, and Ernest Irwin, general agent, Associated Tel. . Co., Ltd., Santa Monica.

teret, president of Exeter Telephone Company, Ltd., was reelected 1st vice president; Orval E. Emley, plant superintendent of Sunland-Tujunga Telephone Company, was elected 2nd vice president, and James S. Campbell, secretary of Consolidated Telephone Company, was elected treasurer. In addition to the officers, the following were elected directors: H. F. Knapp, owner of Sanger Telephone Company, Sanger; J. W. Newman, president of Coachalla Vallege Home Telephone and Telegraph Company of Thermal, and O. A. Prest, manager of the Telephone Division of California Water & Telephone Company, Monrovia. Robert E. Bennett was elected Secretary.

Washington and Oregon Independents in Joint Convention

THE Washington and Oregon Independent Telephone Associations held a joint convention at Hood River, Oregon, June 28th and 29th, which must be classed as unique in the history of Independent Telephony in the Western states and an outstanding event by any measure. It was attended by nearly 300 Oregon and Washington telephone men, their ladies and friends, as well as a large contingent of manufacturers' representatives.

E. R. Hannibal, vice president and general manager of the West Coast Telephone Company of Everett, and Chas. E. Wells, president of the Northwestern Electric Company of Hillsboro, Oregon, were again elected as presidents of their respective associations. D. M. Yost, of the Edmonds Telephone Co., was elected vice-president of the Washington association. D. O. Hood, president of Columbia, Utility Company at Klamath Falls with offices in Portland, Oregon, was elected vice-president of the Oregon association.

The Washington Association reelected Mr. J. W. Baker, Interstate Telephone Co., Spokane, as secretary-treasurer. Leslie A. Gritten, District Manager of the West Coast Telephone Company at Forest Grove, was reelected secretary-treasurer of the Oregon association.

The directors of the two associations for the ensuing year are: Oregon—Mrs. Geo. Bauman, Lowell Brown, J. M. Gilbert, Geo. Muhle, W. A. Schaefer, T. J. Wells. Washington: G. J. Stover, W. H. Dean, B. I. Palmer, P. Sintaffer, L. Finholm, I. E. Rudolph, D. Burr, G. S. Gaines.

At the invitation of T. J. Wells, Redmond, Ore., was selected for the 1941 convention of the Oregon association. The Washington association will hold its 1941 convention in Wenatchee.

Front row: E. R. Hannibal, re-elected president of the Washington Independents and Charles E. Wells, re-elected president of the Oregon Independents.

The convention officially started with registration at 9 A.M., Friday, June 28th at the Columbia Gorge Hotel, located about two miles west of Hood River in Oregon. The arrangements were as good as the locale. The Oregon-Washington Telephone Company, whose headquarters are located in Hood River, were hosts to the Convention. The credit for an extraordinarily successful convention goes to the officers of that company, notably W. H. Dean, president, and to George Muhle, superintendent. Mr. Muhle, as chairman of the program committee, carried the heaviest burden and he was ably assisted by a committee consisting of Messrs. Zola Brooks, Hood River, J. W. Baker, Spokane, Ray Dalton, Everett, and L. A. Gritten of Forest Grove.

Roy Samuel, Mayor of Hood River, made an address of welcome for the City of Hood River after which the actual business of the convention opened with a brief address by Charles E. Wells, President of the Oregon Association. Mr. Wells discussed the great value of the work that has been done by both associations during the past many months. He particularly stressed the fine work of the Toll Settlements Committees, representing a great deal of research and hard work bearing on the necessity for revision of the present contracts for division of toll revenue.

C. G. Duffin, the able and popular General Commercial Agent for the Pacific Tel. and Tel. Co. in Portland, discussed the relations of his company with the Independent connecting companies.

Mr. O. C. Hoff, General Plant Engineer for The Pacific Tel. & Tel. Co., spoke on the subject of recent construction methods.

Opening the afternoon session, E. R. Hannibal, president of the Washington Association, said, "Since we met together last June the long awaited war broke out in Europe. The aspirations for world domination of one man has already cost untold thousands of lives and untold billions of dollars of losses in property, together with the loss of freedom and self determination of six countries, who last year were separate and distinct entities in the family of nations. Just how far the domination of this one individual will go is impossible for anyone to foretell.

"We do know, however, that every person in the world will be affected in some way by the operations of the huge war machine which is devastating Europe. Even the smallest of our telephone companies will feel the effect of this conflict because of the necessity for the United States of spending billions of dollars in armaments to pro-

(Please turn to page 36)

An Analysis of Public Relations

Atwell Jackson
Telephone Sales Consultant for
TELEPHONE ENGINEER readers.

By ATWELL JACKSON

AFTER all—you know this fellow called Public Relations. He has been named such a variety of titles over the past twenty or thirty years that you can safely pull off his false whiskers and call him by his right name—**SELLING.**

There is no purpose in kidding oneself into the use of a more expensive name for a sales, merchandising and publicity program. Students of journalism, lacking fare to Washington and a yen to tell others what to do have hung up shingles as "Public Relations Counsellors"—while those who had a few years of not too successful experience on a newspaper or magazine label themselves as the "Public Relations Experts."

While it is true that some of the vast enterprises, which would include the Bell System, have need to establish true public relations, these concerns are so few and so widely separated that a mere handful of highly skilled public relations men can do the job. True public relationship should be operations in the collateral or influential markets.

Strong institutional talks before groups of club women, civic bodies and folks of influence is a job in public relations. The necessity for the **easing** of **harmful publicity** is more in keeping with public relations than any form of contact that exploits a market for new sales outlets. It is a job of an industry and not an individual concern.

What the Independent telephone company needs is not so much public relations BUT STRONG OLD FASHIONED SELLING.

THERE is a dead hand that lays very heavily upon the selling activitiy of the telephone industry. This hand is the hand of ancestor worship that follows the rule classification of the telephone in the **demand merchandise class.** The high percentage of telephones were installed, including all telephones throughout the country, principally because the subscriber needed a phone. While it is true that advertising did its part, it served principally as reminder advertising and not as a straight selling tool.

The telephone subscribers today, as a body, utilize the facilities of the telephone services because they believe that they need it—and in many cases the belief is that they cannot do without it.

The important consideration of the Independent company when planning his expansion program is a study of the return he'll realize on the volume of new business which he obtains. If his calculations and experiments prove that he'll lose money on his new subscribers without adding any substantial gain—then it is foolish to try for this market below the break-even point of doing business.

The analysis of a sales program for the independent telephone company can be summed up in one paragraph, as follows—

"You have something to sell—it is a service. You believe that people should buy this service. The people you want to sell believe that they can do without your service. They believe that the money can be spent for a better purpose. So it rests upon you to prove why your service is more necessary than other purchases for which they are spending

E 62
OLD TELEGRAPH LINE
ONE OF THE FIRST TELEGRAPH LINES IN THE WORLD. A PART OF THE WASHINGTON-NEW ORLEANS TELEGRAPH COMPANY WAS BUILT FROM WASHINGTON TO PETERSBURG IN 1847. FROM THIS THE ROAD TOOK ITS NAME.

It's Odd But True

Monument to a Telegraph Line

On telegraph road near Mount Vernon the home of George Washington about twenty miles south of Washington, D. C., stands this steel marker a monument to the first telegraph line in the world. This line was a part of the Washington-New Orleans Telegraph Company and was built from Washington to Petersburg in 1847—Submitted by Ray Blain.

AUTOMATIC EL

Provide the Finest Business ph

Money Can

LIGHTNING-FAST AUTOMATIC INTERIOR SERVICE
TRUNK CALLS PLACED OR "PICKED UP" FROM ANY TRUNK-CONNECTED STATION
EASILY AFFORDED BY SMALL FIRMS SINCE NO ATTENDANT IS REQUIRED
READY FOR INSTANT USE DAY AND NIGHT
STATIONS CAN BE "RESTRICTED" OR NON-RESTRICTED", AS CUSTOMER DESIRES

• The simple P-A-B-X system shown in the diagram is typical of the new, low cost P-A-B-X's many companies are using to improve service to their smaller business customers. Such users appreciate modern service features such as those listed at the left, and as a result these systems command rates which bring attractive revenue to the operating company.

For the larger businesses, additional executive and business control facilities can be provided as special features of P-A-B-X service. These include Code Call, Conference, Executive Loud Speaker, Executive Key Calling, Right-of-Way, Watchmen Checking—all considered highly valuable to modern management by efficiency experts.

AUTOMATIC E

MAKERS OF TELEPHONE, SIGNALING AN UNICAT
ELECTRICAL ENGINEERS, DESIGN CONSU

Distributors in U. S. an
AMERICAN AUTOMATIC ELECTRIC SALES COMPA Van Bure
Export Distributors: AUTOMATIC ELECTR COMPAN

ELECTRIC P-A-B-X's

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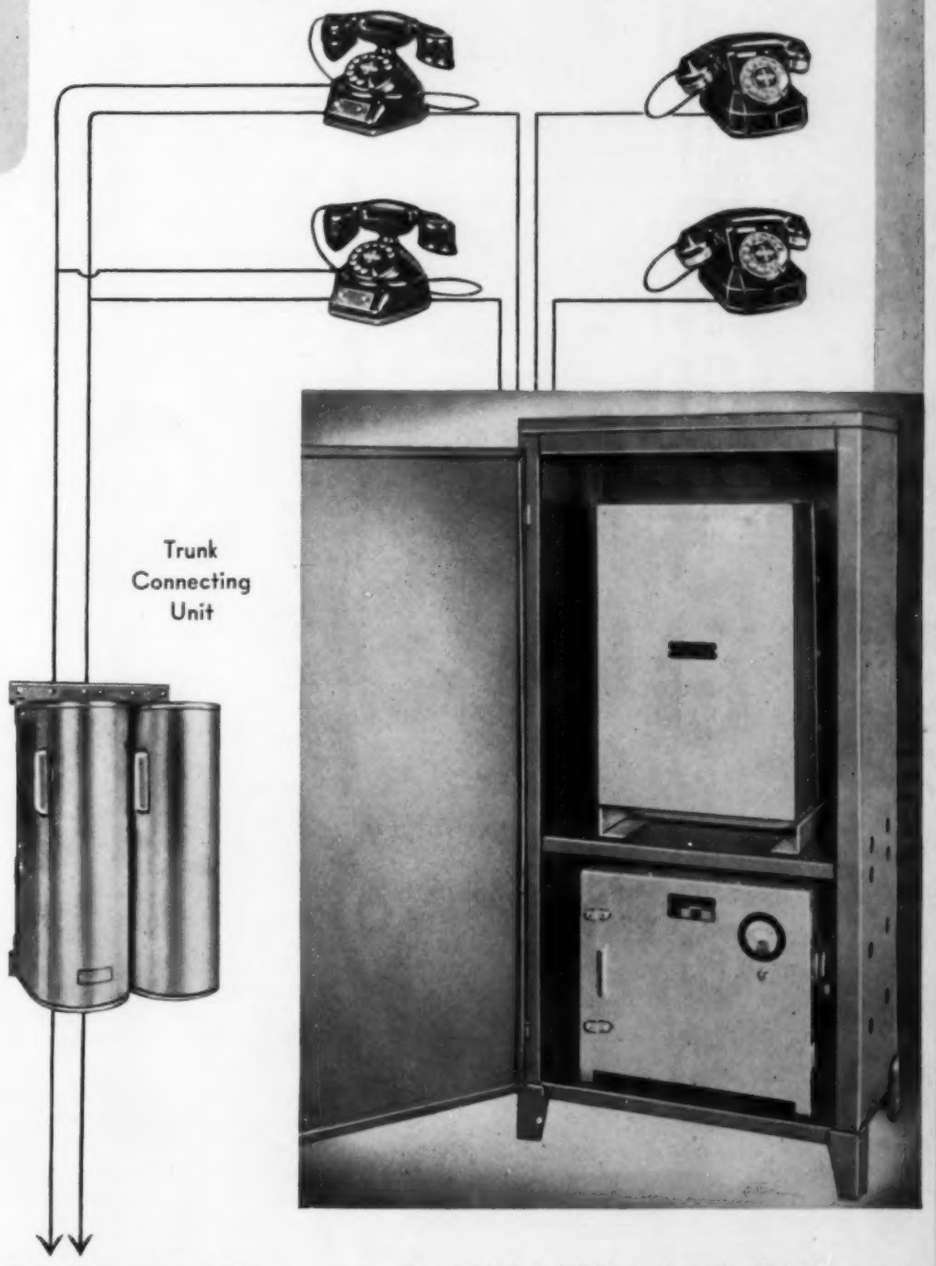
THIS SIMPLE SYSTEM PROVIDES P-A-B-X SERVICE AT A NEW LOW COST . . .



Two trunks to Manual or Automatic Central Office

The Type 32A21 P-A-B-X, equipped with battery eliminator, is mounted in a neat-appearing all-metal cabinet.

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B-X systems. We have helpful sales
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ou upon request. Write for it—today!

ECTRIC

LING AN UNICATION APPARATUS
, DESIGN CONSULTANTS

in U. S. an
COMPAN Van Buren Street, Chicago, U.S.A.
C ELECTR COMPANY, LIMITED

money. In other words, between your selling and the consumer's buying there are certain obstacles which arise. TO MEET AND OVERCOME THESE OBSTACLES IS THE PURPOSE OR OBJECT OF ANY SALES PROGRAM YOU MIGHT CREATE. Call it any name that you will—BUT THAT IS WHAT MUST BE DONE."

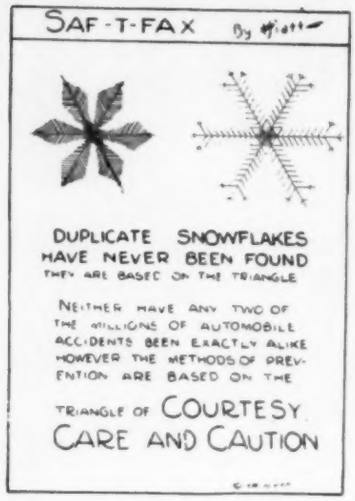
THAT is the essence of all selling—TO OVERCOME OBSTACLES. The objective of any business who has something to sell should be planned to overcome these obstacles. And a business will parish that does not **have an object** as its core.

A concern can go through a lot of wizardry and witch-doctor wand-waving with plans galore and ideas a'plenty BUT UNTIL A NON-USER OF TELEPHONE SERVICE IS CALLED UPON AND **ASKED TO USE THE SERVICE,** the plans will look good on paper, but very, very hollow in returns. In fact one should go beyond **asking** a prospect to use a service—he should tactfully require the prospect to prove why **he does not use the service.** AND WHEN THE OBSTACLE TO THE SALE ARISES **IF** YOU CAN **OVERCOME IT,** THEN YOUR PLAN IS A GOOD ONE, IF YOU CANNOT OVERCOME THESE OBSTACLES THEN THE PLAN IS A BAD ONE.

The beginning of any program for the Independent telephone owner begins with that owner himself. The man who heads a business, whether it is composed of two employees or two hundred thousand, casts a reflection of his personality and his capacity throughout the entire organization. This is especially true of his selling capacity and the attitude of his public acceptance.

To divert for a moment, it might interest the reader to hear of a fable that was told years and years ago. This fable concerned a meeting held by the gods upon the high mountain where they were accustomed to meet. The purpose of this meeting was to find a way whereby man would have difficulty in finding **success.** In those days, it seemed, **success** came too easily to the people and the gods were set upon hiding success where man would find it difficult to discover.

One of the gods suggested the bottom of the sea as a fitting place of concealment; yet others thought of the clouds and many suggested the depths of the earth. But the wisest of all, who made the final decision said, "NO" to all suggestions and advised that the one place to hide **success** where man would experience the greatest difficulty in finding it—would be to conceal it


SAF-T-FAX
DUPLICATE SNOWFLAKES HAVE NEVER BEEN FOUND
THEY ARE BASED ON THE TRIANGLE
NEITHER HAVE ANY TWO OF THE MILLIONS OF AUTOMOBILE ACCIDENTS BEEN EXACTLY ALIKE HOWEVER THE METHODS OF PREVENTION ARE BASED ON THE
TRIANGLE OF COURTESY CARE AND CAUTION

within man himself.

AND in this instance—it appears that this wise old sage was right. For man looks everywhere to find success—everywhere, usually **but** within himself—and that is the one and only place where man will ever find success.

Owners of Independent telephone companies are no exception to this rule, for together with other types of business men they are prone to try all sorts of ideas, schemes and plans, half in expectancy and half in fear; always hoping that one of these plans will "turn out." However the one basic idea that is one of the oldest on earth is good old-fashioned work. The kind of work that originally built the company—the type of visiting with the people either in person or by some persuasive representative—is the kind of work that will build new subscribers and add additional business from the old ones.

Do I mean that all other plans should be pitched overboard and a campaign of wearing out the soles of shoes rather than wearing out the seat of the pants should be in order? Not wholly! For it would be totally foolish for a business man to ignore some of the proved modern sales helps that can be created to reduce friction in the physical action of selling. Newspaper copy has its place. Direct-mail material has its place. But both should be an integral part of personalized selling. And if the Independent telephone company does not intend to follow-up and cash in on the sales aids he pays for—the sales aids are of little value except to flatter the vanity of an individual who sees his own name in print.

Throughout these long years of depression we have talked about getting back to fundamentals. We all need drop out of the stratosphere of manipulations and deals and get back to the fundamentals of common sense. Common sense and hard work built your company. Common sense and hard work will expand the company and will give you any results for which you seek.

Yes—the Independent telephone companies do need a "public relations program." Just as any other type of business needs a 'public relations program." But shorn of all irrelavant factors this program should be one that will add new business and increased profits or it will not be worth the paper upon which it is written.

To develop a sound "public relations" or sales program—first determine in your own mind WHY YOU WANT SUCH A PROGRAM. Specifically what do you expect such a program to do. Then determine what obstacles are in your path that must be overcome to reach this objective. Then set about to combine the facilities of advertising, publicity and personal selling to overcome these obstacles — AND YOU WILL FIND THAT YOU HAVE A HIGHLY SUCCESSFUL "PUBLIC RELATIONS PROGRAM." ONE THAT IS NEGOTIABLE AT THE BUTCHER SHOP.

Business Building Ideas in Book Form

Here is a book that is a natural for any Independent telephone company. Here are hundreds of ideas and suggestions for sales letters, sales contests, records, reports and sales department material. Here is a book that is filled to the brim with field tested promotional methods that can build business for those who are willing to spend a few dollars and take a little time to get results.

Step By Step In Effective Sales Promotion treats (1) Sales Analysis and how to analyze a problem, (2) Sales Application or how to educate those who use the information for sales purposes, and (3) Sales Presentation or how to develop in effective sequence the information for closing business.

This book also contains an unusual collection of sentences, phrases and paragraphs that act as leader ideas for writing direct mail pieces and sales letters.

It is bound in loose leaf form in ring binder and offers facilities for inserting material of the individual company within its binding, thus permitting the creation of a company sales policy book, all in one binder.

The cost of the book is $12.50 and it is guaranteed to produce at least one idea that is worth its cost or refund of money. It may be purchased through the book department of TELEPHONE ENGINEER.

25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of JULY, 1915

The July, 1915 Telephone Engineer carried an article written by E. B. Fisher, president of the Independent Telephone Association of America (now U. S. I. T. A.) commenting upon the "Kingsbury Letter," which has become a historic document. "Dad" Fisher was known as the Dean of Independent telephony and was an outstanding fighter for the business he loved until the day of his death.

▼

An interesting sidelight on the importance of the telephone is gleaned from the July issue, twenty-five years ago, in its account of the three-day strike of the transportation companies in Chicago, when telephone shopping was resorted to by both business concerns and housewives. It was necessary for the telephone company to employ 150 trucks to transport the operators to work; calls increased a million a day during the tie-up period.

▼

W. S. Vivian as secretary of the Independent Telephone Association of America was holding operators' schools throughout the country in an endeavor to install uniformity in the work of handling calls.

▼

The Texas Grain Dealers' association demanded of Governor Ferguson that the state take over control of the telephone industry in that state, through a commission for that purpose. Texas is one of the few states now without commission to control utilities, as the matter has never been settled.

▼

Federal courts invalidated contract with the Federal Telephone & Telegraph company of Buffalo, N. Y., releasing that company from furnishing the city free telephone service. Other matters were concerned also, but this was an outstanding item.

▼

Victor W. Page offered a special treatise on the repair and maintenance of Model T. Ford cars, because of the fact that Ford had produced and sold nearly 600,000 cars at that time. The publication retailed at $1.00 per copy. It made a hit at that time.

Judge Reverses Commission Ruling

In the Coffey county district court June 24, Judge Joe Rolston, Jr., made a ruling reversing the Kansas State Corporation commission, which had approved the plans and specifications for electric lines by the Coffey county REA project.

In the case, the Central Kansas Telephone company, which operates rural lines in Coffey county, appealed to district court the state commission's ruling approving REA line construction paralleling the line of the telephone company. The telephone company claimed that the proposed electric line, which would use the ground to complete a circuit, would cause "inductive interference" resulting in making the telephone line non-servicable.

Judge Rolston ruled, on grounds that law provides one utility cannot damage the property and service of another, that the state commission, which handles utility problems, had made an unlawful ruling approving the REA plans and specifications.

Judge Rolston further ruled that it was the duty of the state commission to make rules and regulations covering "inductive interference," which was not clear in the commission's approval of the REA project.

In a reservation clause in his decision, Judge Rolston said that the State Corporation commission in its approval of the REA plans and specifications had considered the question of "inductive interference" and if its regulations covered that point, the commission's proceeding were not unlawful.

The fight on the REA project, Judge Rolston explained, centers around whether the telephone company or the REA co-operative using parallel right-of-ways will have to use a metallic circuit, which is more expensive than a grounded circuit.

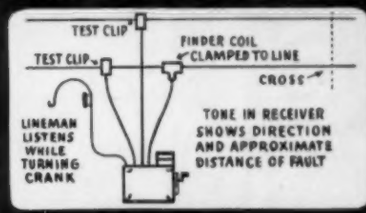
Judge Rolston said it has been indicated the case appealed to his court will be carried to the state supreme court. Many utility men were in Burlington when Judge Rolston read his decision.

(*L. J. Pilcher, superintendent of the Coffey County Rural Electric Co-Operative Association, assured prospective customers that the legal difficulties of the association and the Central Kansas Telephone Co., would not hold up construction.*)

Weekly Payroll

In March of 1940 telephone and telegraph companies employed 382,200 persons and had a weekly payroll of $12,403,000.

YOUR LINEMAN CAN FIND "SHORTS" THIS TIME-SAVING WAY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TEST CLIP
FINDER COIL CLAMPED TO LINE
CROSS
LINEMAN LISTENS WHILE TURNING CRANK
TONE IN RECEIVER SHOWS DIRECTION AND APPROXIMATE DISTANCE OF FAULT

With a WEST TEST SET

Shorts, grounds, crosses, opens, arrester faults, high resistance joints — all are easier to track down with the West Test Set.

The diagram shows how short-circuits are quickly located by the "tone volume" method. This is typical of the simple way this instrument works.

Easy to use, and accurate, the West Test Set makes your lineman's work more productive, because he spends less time "hunting". Write for circular and price.

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TELEPHONE, SIGNALING, AND COMMUNICATION APPARATUS

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1033 West Van Buren Street, Chicago, U.S.A.

LINE and DESK

RAY BLAIN, Editor

Q. What type of guy guard is considered best for general telephone work?

A. In this connection we will state that any of the approved types now on the market can be used with complete satisfaction. These guards are not overly expensive, are easy to install and make a good target to avoid accidental contact with guy wires.

Q. We are in need of an extra long soldering iron for use in a large multiple type switchboard for repair work. Can you advise us how an extension may be installed on a regular electric soldering iron?

A. It is not believed that an extension on a regular electric soldering iron would heat properly for use on soldering in a multiple. A special multiple soldering iron 24" in length, especially designed for such work may now be purchased from telephone supply houses at a reasonable cost.

Q. What type of emergency ringing power supply is considered best suited for use in a small common battery exchange during commercial power failures?

A. The ordinary hand generator, one mounted in each position is the easiest to provide and is at the same time inexpensive. A battery operated, vibrating type ringing interrupter is also considered very good. A relay may be used if desired for switching the machines automatically in the event of a failure of the commercial power supply.

Q. Advise whether you consider the use of creosoted wood manholes satisfactory on a buried cable installation?

A. While this type of manhole has been used to some extent on buried cable jobs and has proved fairly successful we prefer the concrete variety in view of its only slight increase in cost. Manholes are not absolutely necessary for buried cable if splices are properly marked but when manholes are used we believe that they should be well constructed from lasting materials.

Q. Will you please advise how we may build a wind-shield to use for the protection of our fire pot on outside cable splicing jobs?

A. In the old days many splicers used the hood from a model-T Ford for this purpose and claimed that they were entirely satisfactory. Now good furnace shields may be purchased at a reasonable cost and in our opinion it will not pay to attempt the building of one locally.

Q. What type of fire alarm is considered best for use in telephone equipment rooms?

A. We are of the opinion that any of the approved fire alarm systems would be suitable for this purpose. One system now generally used and as we understand has proved entirely satisfactory is to run a special fusable metal wire, attached to the cable forms, on all equipment racks and distributing frames. A special rise in temperature of several degrees at any point will cause the wire to part and sound an alarm.

Q. We are experiencing considerable difficulty with our manhole ladders rusting. In our section of the country manholes are very wet the greater part of the year which no doubt accounts for our trouble. Will you advise how this difficulty may be avoided?

A. We have never known of any trouble due to rust of manhole fixtures, even in wet locations, when they are properly galvanized. Cheap fixtures do not last and should never be used. Manhole ladders and insert steps made of wrought iron have also proved entirely satisfactory on various utilities for a number of years.

Q. When a pole forms a slight corner in a line and the pull does not justify the installation of a guy how may it be anchored?

A. One good method is to key the pole by placing a cross-timber against the pull just below the ground level. This timber need not ordinarily be over 3 feet in length. Another method is to attach two 2"x12" creosoted planks, about 2-feet long to the pole with two through bolts in a clamping effect. These planks are attached to the pole about 6" below the ground level.

Q. We have a lot of trouble in our town in obtaining distilled water for use in the storage battery. Can you advise us how some means can be provided whereby we may treat water locally to remove impurities so that it may be used safely in our storage batteries?

A. The only means we know of whereby this may be done safely is to run it through a small water still. An automatic type of small still for either electric or gas operation may be obtained at a small cost and in your case it is believed would prove an excellent investment.

Q. In the interest of economy is the installation of aerial cable on a power pole line considered justified?

A. Joint construction is considered entirely satisfactory when proper clearance between the two services is maintained. To provide this clearance poles of proper height, 35-feet or longer, should be used on all joint construction. Separation of telephone cables from electric circuits not exceeding 7500-volts should be not less than 4-feet. This separation should be increased to 6-feet for voltages up to 50,000. A climbing space of at least 30-inches should be maintained on all jointly used leads to help insure the safety of linemen.

Q. In the repair of line breaks we find that often we are unable to pull enough slack to make a new splice. If extra long sleeves were available the use of two sleeves and a short length of wire would be avoided. Can you advise us as to whether such a sleeve can be obtained?

A. A special, extra length, compression type repair sleeve is now available and can be procured from any telephone supply house. These sleeves can be obtained in 14 and 12-BWG and are 7" for the 14 and 7½" for the No. 12. The same type sleeve may also be obtained for use with copper wire of various sizes.

Q. When telephone fixtures must be mounted on sheet rock walls what type of anchors should be used?

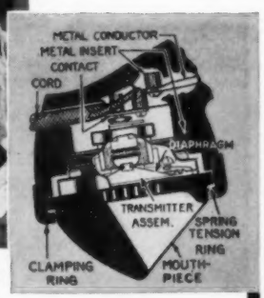
A. For all ordinary work of this nature we would recommend the use of the proper sized toggle bolts. This makes a neat and good job if the toggles are installed properly.

Q. What tool should be used to cut switchboard cable on a large installation job?

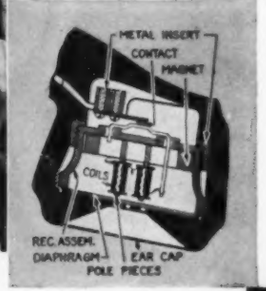
A. Regular cable cutters should be used for this work though if not available ordinary pruning shears may be successfully used.

Both are

Good Lookers—Good Talkers



damping of the diaphragm
excessive tension is in-
at all times because the ear
thread is entirely indepen-
of the receiver's mounting
The result is a quality of
on that pleases subscribers.



ented transmitter used with
Stromberg-Carlson Handsets
es the cone-shaped dia-
m of the radio speaker. It
as a rigid piston. Maximum
ility is insured by annular
ations near the outer edge.

We're all familiar with the slang expression, "beautiful but dumb." Yet when one finds a woman who combines looks, intellect and conversational ability, her charm is easily established.

Applying the same thought to a handset, it first must be good-looking to enable it to fit in with the richest surroundings and the decorative schemes, but it must also make telephone conversations easier and clearer, if it is to win subscriber approval.

The Stromberg-Carlson No. 1212 Handset, because it possesses unquestioned good looks, delights the subscriber's eye. The special transmitter and receiver used in this handset delight the subscriber's ear. That's why many operating companies find the Stromberg-Carlson No. 1212 Handset an ideal sales builder.

Order a test sample of this outstanding telephone achievement.

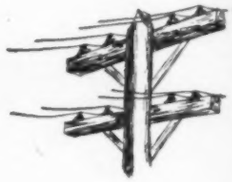
STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Factory and General Offices: 100 Carlson Road, Rochester, N. Y., U. S. A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY-FIVE YEARS

LONG LINES

R. A. Clark, Jr.



Telephone Equipment Protection

THE protection of telephone apparatus and associated equipment has always been a serious problem. At almost every meeting of telephone engineers the question arises and many arguments ensue. The protection problem is of particular importance on long open wire lines where the exposure is more severe than in the case of cable circuits. Arresters of the carbon block type afford a high degree of protection but many times ground the line permanently after a severe lightning storm. This obviously impairs service which often times is badly needed during and after the storm.

An improvement over the carbon block type arrester has been the combination saw-tooth and carbon unit. This very seldom grounds the line permanently and affords a higher degree of reliability. The flash-over value is somewhat higher than the standard carbon block, however experience indicates that the ordinary telephone equipment is adequately protected.

Another method of improving the reliability consists of the installation of heavy duty power type arresters at intervals along the telephone line, also out about one span from the standard carbon block protection. The ground for the power arrestor should be connected to the carbon block arrester ground. This combination will often prevent blowing of the protector fuses when the carbon arrester operates. The power arrester should be equipped with a gap of about 15 to 20 mil spacing. Even though the flash-over is much higher than that of the carbon block arrester it functions to prevent blowing of the fuses. While this may seem contrary to theory the practical tests have repeatedly demonstrated this fact.

On telephone lines exposed to power circuits a combination arrester and magnetic relay has proven quite successful. The circuit is shown in Fig. 1. A surge passing through the gaps operates the relay which in turn short-circuits the gaps thus taking the load from them. The relay contacts are designed to pass currents from 50 to 75 amperes and will therefore protect against any surge which may occur. The relay will pull up within one cycle thus relieving the load on the arrester promptly.

Equipment such as telephone repeaters

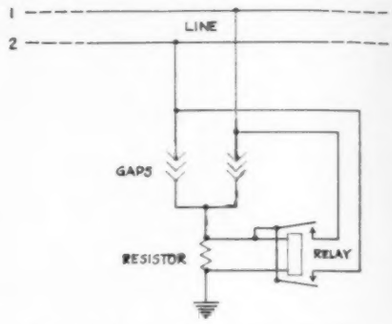


Fig. 1—Circuit of relay type protector.

and carrier apparatus which utilize A-C power require protection on the power side as well as on the telephone line. Lightning surges will pass through the ordinary power transformer and often times may reach several thousand volts. A low voltage power or signal type arrester on the equipment side of 600 volt cartridge type fuses will generally suffice. Added protection can be had by the installation of a small condenser across the power terminals of the equipment. This condenser should have a rating of at least 1,000 volts and should have a capacity of ½ to 1 MF. It should be connected as close as possible to the telephone equipment. Fig. 2 shows the complete protection of a telephone repeater utilizing all of the devices mentioned above. Whether or not all of the devices should be employed will depend upon local experience. Many installations will not require the complete arrangement. Others, where the service requirements are severe and the hazards great will amply justify the expense.

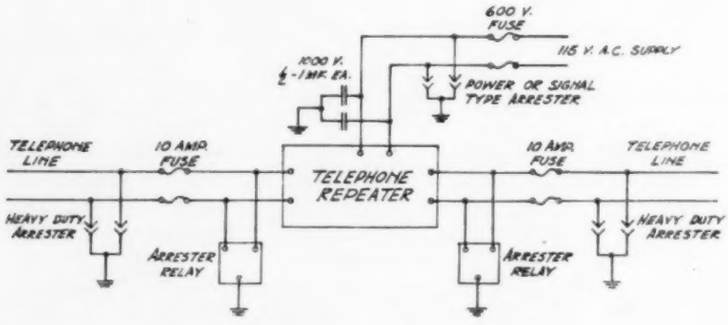


Fig. 2—Complete protection of a telephone repeater.

Station Gain

An increase of 18,100 telephones in use in the Bell system in June was reported by the American Telephone and Telegraph Company. The gain for May was 86,600 and for June, 1939, the increase was 15,800. This brought the increase of telephones the first six months to 449,000, compared with a gain of 370,000 in the first six months of 1939.

"Eveready" "Air Cell" Installations . . .

NATIONAL CARBON COMPANY, INC.

specifically

GUARANTEES

that the "Eveready" "Air Cell" Telephone Operators' Transmitter Batteries, Nos. T-2600 and T-1600—when used in the telephone service for which they are designed and in connection with transmitters of modern design, and when properly installed and maintained according to directions provided therewith—will deliver a minimum of 6,000 hours at peak transmission efficiency.

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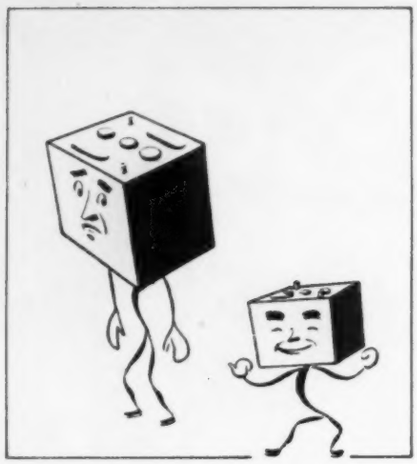
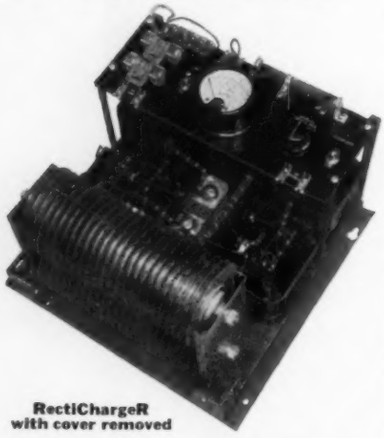
SPEAK FOR THEMSELVES!

An "Eveready" "Air Cell" Installation consists of one No. T-2600 and one No. T-1600.

The words "Eveready" and "Air Cell" are registered trade-marks of National Carbon Company, Inc.



Sometimes you can use smaller batteries when you switch to a Raytheon RectiChargeR, but always you can be sure of getting the most out of them. RectiChargeRs have a steady output voltage, prevent overcharging and overvoltage troubles such as short lamp life, sticking relays, incorrect ringing and frying transmitters.



RectiChargeR with cover removed

A RectiChargeR with a small storage battery floating across its terminals makes a complete, automatic AC-DC constant voltage telephone power unit. All components are long-lived and maintenance-free. Your usual source of telephone supplies will help you select the correct RectiChargeR for your needs. Write for bulletin DL-48-263ATE.

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134 WILLOW STPEET, WALTHAM, MASS.

NEW PATENTS

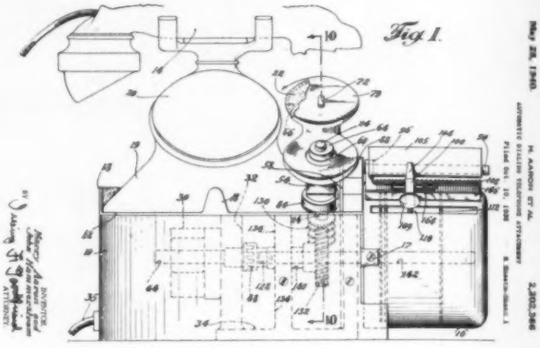


Fig. 1. Description of Automatic dialing attachment described directly below.

Automatic Dialing Telephone Attachment

This invention relates to an automatic dialing device, and more particularly to one which is portable and may be readily and detachably associated with a conventional automatic dial telephone. The invention still further relates to such a dialing device which may be selectively operated by the user to automatically dial telephone call numbers selected by the user from a pre-established group of such telephone call numbers.

In certain commercial offices, such as those of bakeries, dairy companies, or like large organizations, the same telephone call numbers are dialed each day. For example, in large cities, in order to ascertain the requirements of its product for that day, it is usual for a dairy company each morning to telephone its regular and established customers, who may number hundreds or thousands. The dialing of a hundred or more telephone numbers from a regularly established list in a given period is tiresome and tedious work and, because of the human difficulty in successively memorizing or mechanically dialing so numerous a selection of telephone numbers, is attendant with errors in dialing which are time-consuming and costly.

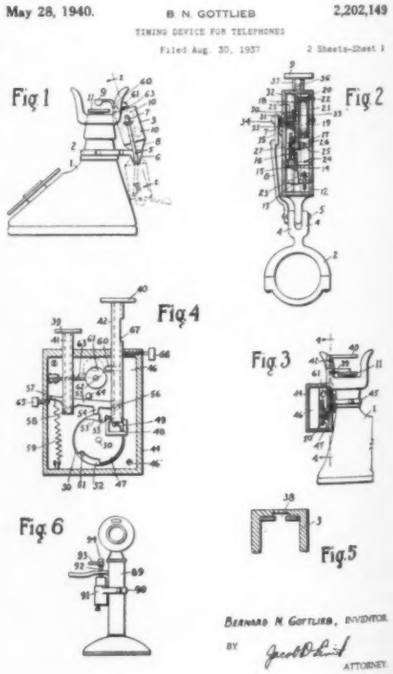
The invention contemplates the provision of a portable attachment, compact in structure, which may be detachably associated with a conventional automatic dial telephone, and which on operation will selectively engage the dial thereof, to automatically operate the said dial in proper sequence to correspond to any telephone call number selected from a pre-established group of such numbers.

Timing Device For Telephones

This invention relates to new and useful improvements in the application of timing devices to telephone systems, and especially to a group of two or more telephones in an extension system.

It is an object of this invention to provide means whereby after a predetermined interval of time a telephone, with its receiver off the hook, will be automatically reconnected into its enunciator circuit.

It is a further object of this invention to provide means which will automatically first give a signal and then return the telephone to its enunciator circuit when the receiver has been removed from the instrument for a given length of time.



"Tapping In" on Washington

(Continued from page 16)

particularly in making a determination as to a learner's rate and a learner's training period should be given positive consideration. It is readily apparent that the political mind of Congress is that the Independent telephone industry serving the smaller communities is entitled to and should receive every consideration." It was also noted that the Independent telephone companies are more frequently found in smaller communities and rural areas and depend largely on limited local revenues which are based on rates generally lower than those charged by the Bell System. Because many of these Independent companies are maintained with a small capital investment their revenues do not permit material increases in wage scales, the brief said, and emphasized to Wage-Hour Administrator Fleming that the telephone industry rates were under strict governmental regulations and could not be adjusted freely to meet added costs.

"Because of this broad control by the various regulatory bodies the increased costs which are at once imposed upon the telephone industry by this (Wage-Hour) legislation." the brief continued, "can only be met by upward rate adjustment approved by the aforesaid bodies. Such approval only follows after long drawn out and expensive hearings —the relief is not speedy in its arrival, and does not constitute a satisfactory solution in the case of the numerous small independent companies. **On the other hand, if the learner's rate that is fixed is such a burden on the companies as to require telephone rate increases, the affect economically is quite disturbing. There is the increased rate to the consumer, followed by the loss of subscribers or restricted service. Such factors lead to an unsettled condition in the telephone industry, which directly affects the ability to employ and the consequent curtailment of employment. Due to all these considerations the Administrator should carefully avoid the saddling of the independent telephone industry with an unreasonable and burdensome learner's rate and period of training."**

THE brief which was filed by the Association's Wage-Hour Committee composed of John H. Agee as Chairman, Vice President and General Manager of the Lincoln, Nebr., Telephone and Telegraph Co.; E. C. Blomeyer as Vice Chairman, Vice President of the Theodore Gary & Co.; J. F. O'Connell, Association President and President of the Commonwealth Telephone Co.; B. L. Fisher, President of the Lee (Va.) Telephone Co.; R. A. Phillips, Vice President of the Central Electric and Telephone Co. and W. C. Henry, General Manager of the Northern Ohio Telephone Co., stated that a questionnaire returned from the industry showed a fair learner operator wage to be 20¼ cents per hour and a learning period of 814 hours for a local operator and 1,212 hours for a toll operator. The Association's Committee proposed a 20c wage for the first six weeks, then 22½c for the second six weeks, 25c for 12 weeks and 27½ for the next 24 weeks. Such a wage rate, the brief said, will more than provide in the Independent industry "the minimum standard of living" for the employees and while it will constitute an additional burden upon the Independent companies, it will be a burden "which can be borne." The brief declared that the Wage-Hour Division Order of a 25c wage rate and a 320-hour training period was "an oppressive and unreasonable burden upon the Independent telephone industry."

The brief pointed out differences between the training of operators in the Bell System and the Independent industry by citing that the Bell System because of its size can train an operator for one job only but Independent operators have to know both local and long distance work.

Radiotelegraph Strike Test Was Significant Because Union Under "Red" Leadership

ONE of the most interesting and significant showdowns against a labor union with reputed Communist leadership has been staged recently in the radio communications field, when RCA Communications by utilizing an emergency staff of administrative and supervisory officials, all ex-operators, kept traffic moving to Europe and the Orient after around 225 union operators suddenly left their keys and remained on strike for 12 days. The Navy and State Departments were vitally interested in the labor dispute because of the importance of maintaining communications to Europe. The operators who walked out returned to their jobs after seeking a renewal of negotiations.

Southern Bell Reduces Interstate Toll Rates by $525,000 a Year

ANOTHER downward adjustment of interstate telephone toll rates with an estimated annual saving of $525,000 to subscribers has been effected by the FCC through negotiations with the Southern Bell Telephone and Telegraph

Release lines that carry charging current to PBX boards for revenue-producing service. Plug in a RectiFilteR and forget it. Requires no servicing or maintenance. Provides low-cost DC power. Pays for itself out of savings.

Raytheon RectiFilteR

Each RectiFilteR installation saves from $30 to $90 a year. Eliminates trouble and expense of frequent inspections. Full range of sizes. Equipped, when necessary, to furnish DC power during AC interruption. Send for bulletin DL-48-156F.

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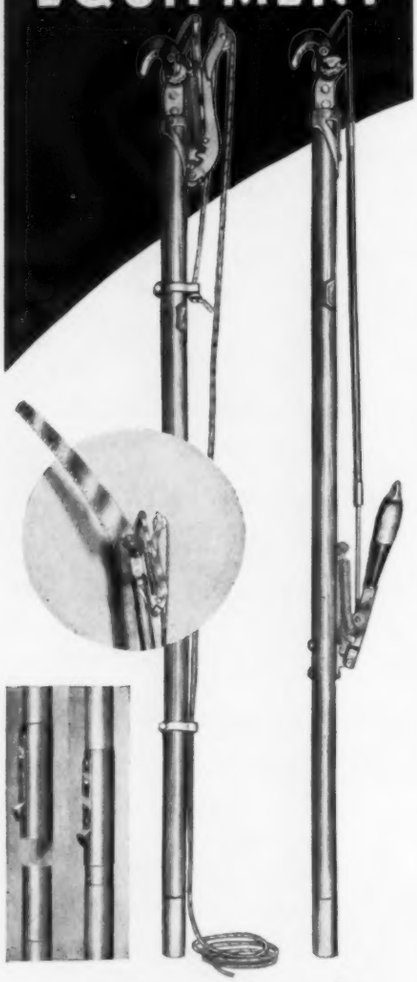


. . . consider the features of TIPS TREE TRIMMERS

Tips tree trimmers are made in two types, as shown, for rope or lever operation. The compound lever design, the wide jaw openings and the heat treated, forged, steel cutting blades make it easy to cut branches up to 1¼" in diameter. Tips universal pruning saw may be attached as shown for trimming larger branches. By simple wing screw adjustment, various sawing angles are obtainable.

Additional pole lengths may be added by means of the splice shown at lower left.

Poles are solid spruce treated with three coats of pole preservative and voltage tested. Rope is ¼" treated spot cord. Pull rod on lever type is laminated plastic. Galvanized promal fittings combine light weight with strength. Write for more complete details and prices.

A·B·CHANCE CO. · CENTRALIA MISSOURI

Co. The Southern Bell made the reduction in the interstate toll rates in its territory to bring them into line with the level of long distance rates of the Long Lines Department of the American Telephone and Telegraph Co.

The reductions affect the rate schedules for distances above 42 miles and produced the greatest decreases in the longer hauls where the new rates will be from 10 cents at 150 miles to 60 cents at 750 miles lower than the old charges. The reduced rates go into effect August 1. This reduction of toll rates in the Southern Bell territory may revive the issue in that section of increased compensation on toll divisions for connecting companies which has been a leading problem for the Independent telephone industry during recent years.

Miscellaneous Notes

THE National Federation of Telephone Workers, composed of 36 independent unions in the telephone industry, has offered President Roosevelt complete cooperation in the national defense preparedness in communications under a resolution at its recent Salt Lake City convention.

While awaiting Senate confirmation on his 7-year reappointment to the FCC, Commissioner Thad H. Brown was summoned by the Army to active duty in the Judge Advocate General's Department. Commissioner Brown has been a Colonel in the JAGD Reserve for 17 years and was also in the World War with the 37th (Ohio) Division.

—END—

Estimating Construction Costs

(Continued from page 18)

tions, of 20% of such poles in the plant from light digging locations to hard digging locations.

Derivation of Labor Relatives

IN THE making of estimates of the cost of proposed plant, if the method of labor relatives is used, it is necessary, of course, to classify the conditions under which the work is to be done in order to avoid the error disclosed by the average illustrations above. With care and a readiness to correct previous error it is not difficult to develop a complete tabulation of labor relatives. This being expressed in Man-hours affords a means of easily adjusting the final result for any variation in wage rates resulting from a difference in time or from a difference in locality.

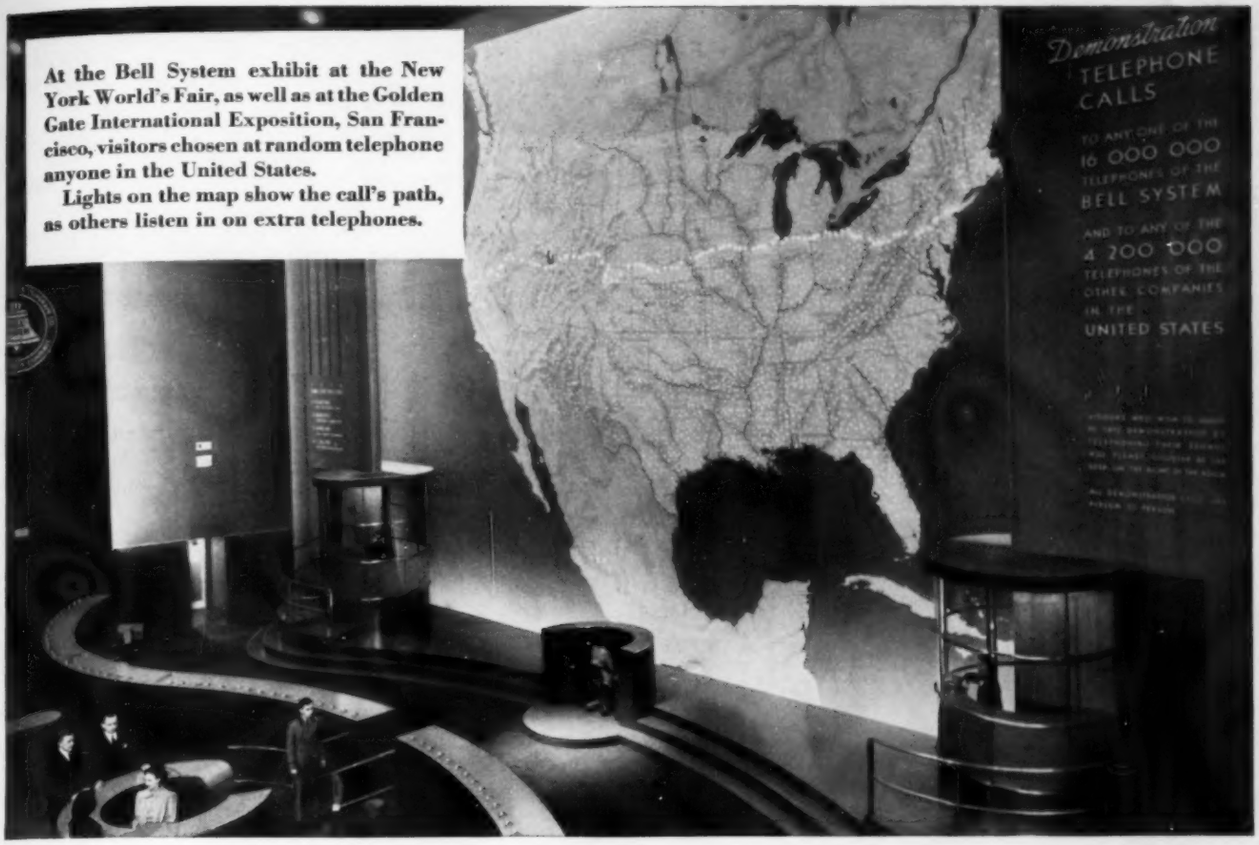
The basic assumption in this method is this. It will require the same average number of man-hours, within very close limits, for skilled men to carry out the same construction operation under the same conditions using the same methods. By the use of this method it is possible to include in the estimate of construction cost the weighting for those conditions which actually affect the total cost. The identification of specific conditions such, for illustration, as the classification of digging pole holes as Light, Hard and Rock should not be carried to a degree of refinement which does not definitely represent a substantial modifying influence on the cost of construction. On the other hand each labor differentiation may encompass a range of conditions from low man-hours to high provided the limits are not so wide as to make possible substantial error. In the case of pole setting the relatives (Relative Man-Hour Requirements) should all be based upon Hand Digging. This is because the operation of digging pole holes by machine is preponderatingly a matter, as far as Man-hours is concerned, of locating and setting the equipment. The actual production of the hole is a very small proportion of the total and the total average man-hours required per pole for machine digging does not greatly vary, for those reasons, for different sizes of pole.

The necessity of gauging the relatives so that they reflect the different conditions in each construction operation may be illustrated by the relatives for the erecting component for twenty five foot class 4 poles of the four principal timbers. This component is dependent, of course, on the weight and bulk of the poles. The basis for this relative is shown below.

It will be noted that while the Creosoted Southern Pine pole is heavier than the Chestnut it requires the same number of man-hours for its erection. This is because the Chestnut pole is 29.4 inches in circumference two feet above the ground while the Creosoted Southern Pine pole is only 27.8 inches in circumference at the same height and is not so bulky and difficult to

Basis for Relatives

Class 4 Pole, 25 foot	Northern White Cedar	Western Red Cedar	Chestnut	Creosoted Southern Pine
Approximate weight	515 lbs.	480 lbs.	570 lbs.	602 lbs.
Erecting Relative in Man-hours	0.440	0.365	0.450	0.450



At the Bell System exhibit at the New York World's Fair, as well as at the Golden Gate International Exposition, San Francisco, visitors chosen at random telephone anyone in the United States.

Lights on the map show the call's path, as others listen in on extra telephones.

Maybe YOUR voice was amplified *a billion, billion, billion times . . .*

The heart of this amplifying system is the vacuum tube, and Western Electric pioneered in making these "Aladdin's lamps of communication." They have made possible long distance telephony, radio and indeed the whole range of modern communication — a striking example of the value to the public of the American way of doing things.

Were you one of the lucky ones? Then the volume of your voice was amplified millions, perhaps billions of times, depending on the distance you talked.

As the diagram shows, the voice fades, and again and again has to be given renewed power in order to reach its destination with all its original clarity and force.

In repeater stations located about every 50 miles, intricate apparatus developed by Bell Telephone Laboratories and produced by Western Electric, performs this wonder—the faithful transmission of speech.

Western Electric *. . . made your* **BELL TELEPHONE**

IF YOU WANT TO BE A

Fault-finder

BE A GOOD ONE!

USE THE NEW

SHALLCROSS

FAULT LOCATION

BRIDGE

Here's an inexpensive, well-constructed instrument that reduces the maintenance cost of communication lines (telephone, telegraph or signal) by *simplifying* the job of locating trouble.

Presents a new idea in cablemens' fault location equipment.

The "Fault Location Chart" supplied with each instrument reduces calculating and distance determination to an absolute minimum. Makes ridiculously easy the frequently necessary job of finding grounds, crosses, shorts, etc. Designed by a telephone engineer. Requires no special skill on the part of the user.

Write today for Bulletin No. 627-NO.

SHALLCROSS MFG. CO.

Instruments – Resistors – Switches

COLLINGDALE, PA.

handle. This illustrates the point very nicely. To be of value in construction cost estimating labor relatives must be accurately gauged to properly weight the characteristics of the operation for which they are compiled.

The accuracy of the labor components of construction costs is of the greatest importance because the costs of materials are matters of absolute record and it is only necessary to accurately determine such elements as freight and a few others and then to include the proper loadings in order to determine the total cost of the material.

The compilation of complete tables of labor relatives for the various units of plant in telephone systems is very tedious. As will be readily seen it is practically a system of cost units for the direct labor expressed in terms of man-hours instead of in dollars and cents. It has the enormous advantage, however, of being suitable for use in construction estimates in any territory, it makes it possible to adjust costs for variation in wage scales and it is readily corrected permanently and as errors are disclosed from time to time.

Association Activities

(Continued from page 22)

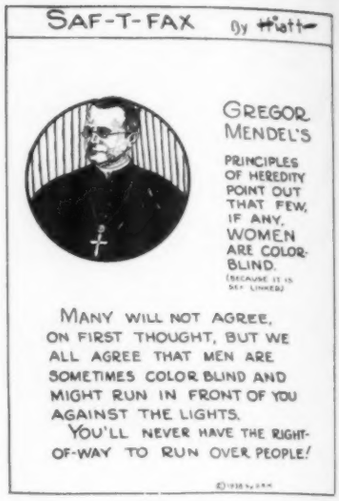
tect ourselves against possible invasion, if not for actual participation in the present conflict. These preparations will mean not only far more strict regulations than we have ever experienced before, but will add to the almost unbearable burden of taxes which we now support. Prices of commodities and materials which we use will undoubtedly increase very materially, and equipment and material will be difficult to obtain. I understand that 80% of the output of one particular factory which supplies us with equipment will be requisitioned by the Federal Government in the huge program of national defense. In fact, there is great danger of our losing the precious freedom which we have enjoyed in this country for the past 150 years, in order that our war machine might be as efficient under unity of command as those of dictator countries.

Ormond R. Bean, Public Utilities Commissioner of Oregon, spoke on the subject "State Utilities Regulation as it Affects the Independent Telephone Companies in Oregon." Mr. Bean discussed the contributions of the various utilities to the expenses of the Public Service Commission.

Don Abel, Director of the Washington Department of Public Service, Olympia, Washington, next addressed the meeting on the subject, "Cooperation Between Independent Telephone Companies and the Department of Public Service." Mr. Abel discussed the independent situation in the state of Washington, particularly as regards the present movement to apply for increased toll revenue. He said that the small independents in their applications for better toll settlements should be prepared to furnish all the detail possible with regard to their actual costs for rendering service.

D. S. Wilkinson, President of the Columbia River Telephone Company, White Bluffs, Washington, an authority of Washington State legislation, discussed forthcoming legislation and, item by item, gave his views and reasons for voting on each measure.

Robert P. Judy, General Commercial Manager of The Pacific Tel. & Tel. Co., Seattle, displayed a motion picture "A New Voice for Mr. X." The picture was a convincing demonstration of the value not only of telephone courtesy


SAF-T-FAX
GREGOR MENDEL'S
PRINCIPLES OF HEREDITY POINT OUT THAT FEW, IF ANY, WOMEN ARE COLOR-BLIND.
(BECAUSE IT IS SEX LINKED)
MANY WILL NOT AGREE, ON FIRST THOUGHT, BUT WE ALL AGREE THAT MEN ARE SOMETIMES COLOR BLIND AND MIGHT RUN IN FRONT OF YOU AGAINST THE LIGHTS.
YOU'LL NEVER HAVE THE RIGHT-OF-WAY TO RUN OVER PEOPLE!

Get Rid of Noise!

with the Improved

VINCENT RARE GAS RELAY

Installed in a Minute

No Moving Parts

Thousands in Service

Fully Guaranteed

Eliminates unbalance noises in metallic party lines employing divided ringing to ground. Works with either harmonic or code ringing.

Write for Catalog 39-A describing

Non-Grounding Rare Gas Arresters

Terminal Strips _ Potheads Housings

L. S. BRACH Mfg. Corp.

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Signal Circuit Engineers Since 1906

but of well co-ordinated telephone methods in office practice.

The major event of the convention was a banquet held in the main banquet hall of the Columbia Gorge Hotel Friday evening. Over 250 people were present. After dinner, followed by the introduction of guests, there was a program of music. This was followed by a dance and a floor show entertainment "Phony Frolics" consisting of fancy dance numbers. The toastmaster was Zola Brooks, who was also completely responsible for the arrangements; Mr. Brooks is to be congratulated upon a most successful and enjoyable affair.

For the Saturday meeting the executives of both associations decided that in view of the great interest aroused by the rather controversial activity of the committees working for an improvement in toll settlements, it would be advisable to hold a closed session. Consequently the Saturday morning session was confined to independent telephone operators and owners only, no outsiders being permitted to take part.

The meeting then went into private session and was addressed by Louis Pitcher, Executive Vice-President, United States I. T. A. Much of Mr. Pitcher's address was confidential. He discussed a number of current topics.

The next speaker was Mr. D. O. Hood, Columbia Utilities Co., Klamath Falls, who discussed at some length the Oregon association's outstanding work with regard to toll settlement contracts. Mr. Hood pointed out that it was essential that the Independent owners should do all that lay in their power to improve their plant and to render the best possible service, as a justification for the increased revenue required.

A sad feature of the Saturday morning session was a telegram read by Mr. Hannibal to the effect that Mr. J. Faust of Ellensburg, Vice-President of the Washington Association, had passed away. A resolution of condolence was passed by the joint meeting and a telegram embodying the resolution was sent to Mr. Faust's relatives.

Mr. Hannibal proposed a motion that there should be appointed a joint committee of both associations to prepare a unified statement covering the toll revenue requirements of both states. He felt that both Washington and Oregon Independent telephone men would have a much better chance of securing a satisfactory settlement if such a co-ordinated demand was made, rather than a separate demand from each state, as the matter stood at present. Mr. Hannibal's motion was unanimously passed by the meeting. After luncheon the Associations met separately for their business meetings, separately reported elsewhere.

Obituary

G. W. Gibson, 79, owner of the Byron (Nebr.) Telephone Company, passed away during June after an illness of over a year.

Charles A. Miller, 54, for many years maintenance and repair man for the United Telephone Company, Center (Mo.) exchange died during June following an operation. Mr. Miller was an old timer in the telephone business having followed it in California prior to moving to Missouri.

Ed Pratt, 54, manager of the Garfield (Ark.) Telephone Co. exchange for the past 14 years, died June 6, at his home in Garfield.

Miss Mabel Hornbeck, for the past 9 years manager of the Boise City (Okla.) Telephone Co. died last month in a Clayton, Okla. hospital. Miss Hornbeck was a native of Illinois and served the Clayton exchange 15 years before being selected as manager of the Boise City property.

Ernest S. Hough, Chicago, vice president and treasurer of the American Cross Arm & Conduit Co., was killed in an automobile crash early this month.

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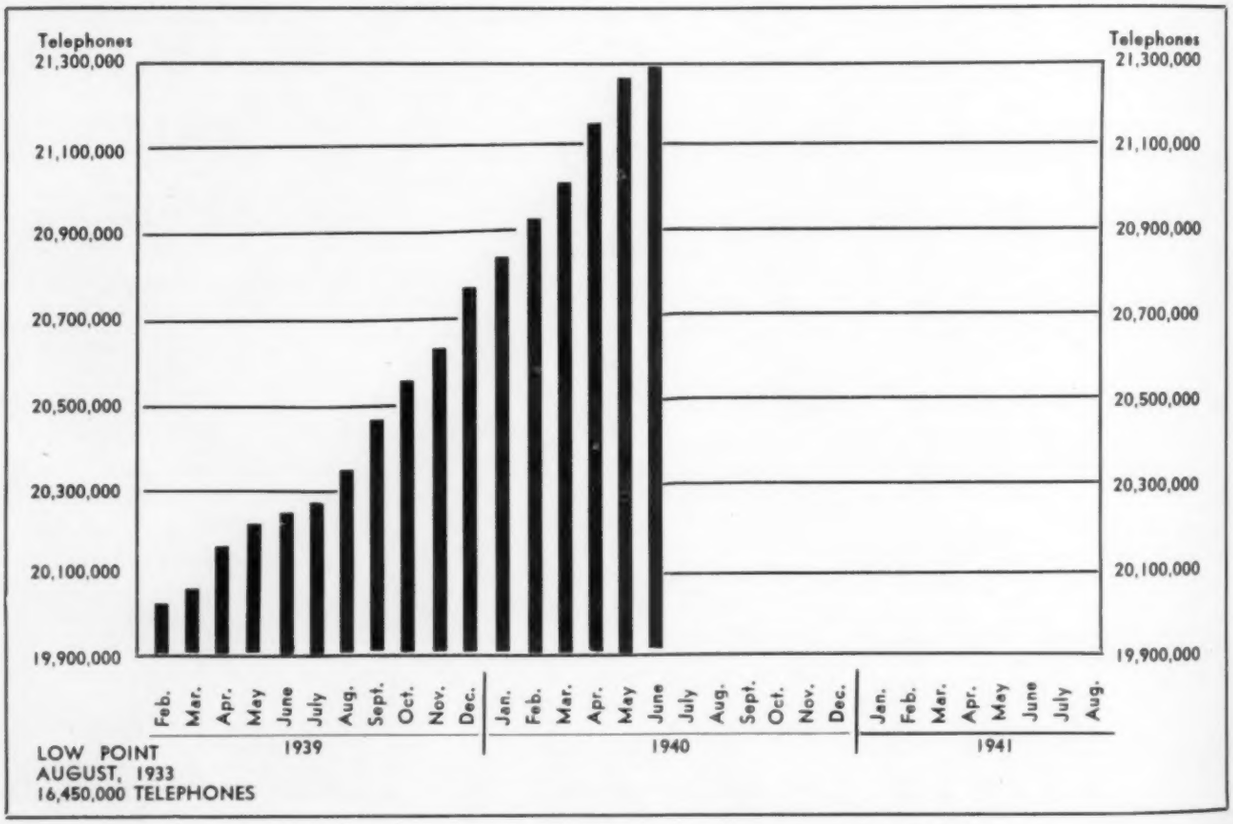


Short Course in Telephone Transmission

(Continued from page 20)

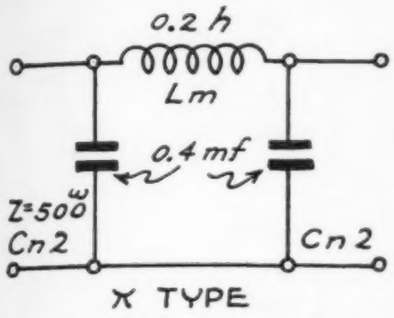


Fig. 6—800 Cycle Lo-Pass Filter

the equation below:

$$Ln=\frac{500}{4\pi 800}=.05 \text{ henry}$$

The capacity arm is computed by the following formula:

$$Cm=\frac{1}{4\pi f_2 K}$$

and substituting the given values we find that Cm is equal to 0.2 m.f. as shown in the formula below:

$$Cm=\frac{1}{4\pi\times 800\times 500}=0.2 \text{ m.f.}$$

Inasmuch as each of the series capacitors is equal to Cm each series capacitor would have a total capacity of 0.4 m.f. as shown in Figure 3.

These same computations also apply to the **pi type section** as shown in Figure 4 in which the shunt element consists of two inductances and the series element a single capacity. The inductance has only half the value of that shown for that of the T section in Figure 3, while the capacity element is smaller than either of the capacities shown in Figure 3.

The filter computations just described are for a single section simple filter which would be suitable only for use in circuits in which a high degree of sharpness is not necessary. For carrier applications filters employing more than a single section are required in order to have a sharp "cut off." (Note: The term "cut off value" refers to the frequency at which a filter begins to cut off or attenuate rapidly.)

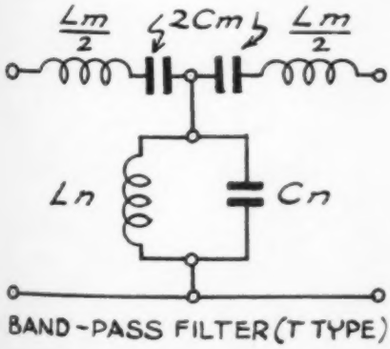


Fig. 7—Band Pass Filter (T type)

Low Pass Filter Design

IF WE wish to design a low pass simple type of filter to operate on a 500 ohm telephone line and have a cut off frequency of 800 cycles the inductance would be found by the formula

$$Lm=\frac{K}{\pi f_1}$$

Substituting our values in this formula we would find that the series inductance element in the T type filter to be 0.2 henry which as is shown by Figure 5 would need to be 0.1 henries each inasmuch as the inductance is distributed to two arms. The capacity of the series

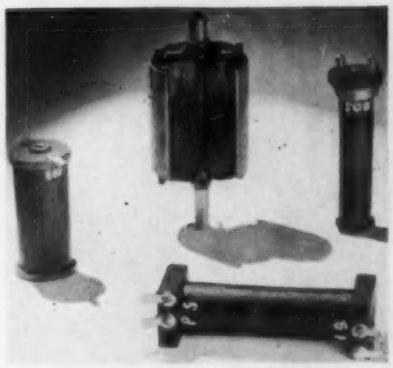
$$Lm=\frac{500}{\pi\times 800}=0.2 \text{ Henry}$$

element is found by the formula:

$$Cn=\frac{1}{\pi f1 K}$$

and again by substituting values we would find that our capacity shunt elements should be 0.8 microfarads.

(Continued next page)



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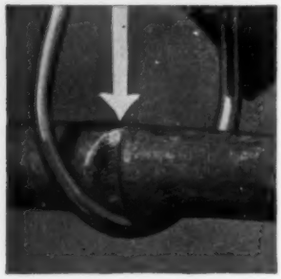

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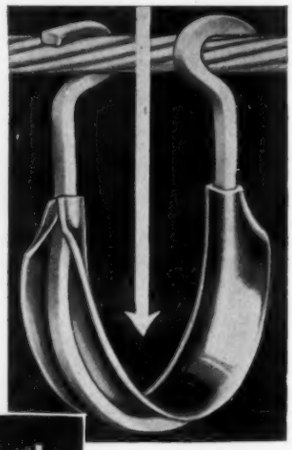

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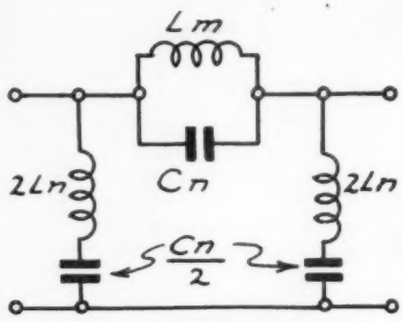

Fig. 8—Band Pass Filter (X type)

$$Cn=\frac{1}{\pi\times800\times500}=0.8 \text{ m.f.}$$

Applying these values to the Pi type network which has only one inductance and two capacity arms we see that the capacity arms would need to be 0.4 m.f. and the single inductance 0.2 henries.

It is interesting to note that in the high pass filter our capacity arms are in series with the line and the inductance arm in shunt while in the low pass T type filter just the reverse is true as our inductances are in series with the line and our capacity in shunt.

Design of a Band Pass Filter

A BAND pass filter consists of a combination of series and shunt elements arranged as in Figure 7. The value of the various capacity and inductance elements as shown in Figure 7 can be computed by the following formulas.

$$Ln=\frac{(f2-f1)\ K}{4\pi(f_1\ f_2)}$$

$$Lm=\frac{K}{\pi(f2-f1)}$$

$$Cm=\frac{Ln}{K^2}$$

$$Cn=\frac{Lm}{K^2}$$

$$\text{Where: } K=\sqrt{\frac{Lm}{Cm}}=\sqrt{\frac{Ln}{Cm}}$$

f1=low frequency cut off
f2=high frequency cut off

Design of Band Stop Filters

BAND stop filters are not as useful as band pass filters, however, have some limited applications in telephone work. A band pass filter is of course designed to reject a small band of frequencies but to pass frequencies on both sides of the critical band. Fig. 8 illustrates the connection in a band stop filter.

Equations for computing a band stop filter are shown below:

$$Lm=\frac{(f2-f1)\ K}{\pi(f1\ f2)}$$

$$Ln=\frac{K}{4\pi(f2-f1)}$$

$$Cm=\frac{Ln}{K^2}$$

$$Cn=\frac{Lm}{K^2}$$

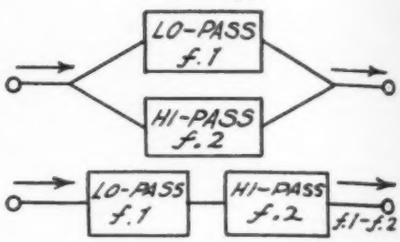

Fig. 9—Band Pass Filter Arrangement

$$\text{Where: } K=\sqrt{\frac{Ln}{Cm}}=\sqrt{\frac{Lm}{Cm}}$$

f1=low frequency cut off
f2=low frequency cut off

A band pass filter or a band stop filter can be constructed by combining an ordinary low pass and a high pass filter, either in tamdem or parallel arrangement as shown in Figure 9.

Purchases Exchange

The Northern Ohio Telephone Company of Bellevue was authorized by the State Public Utilities Commission during June to buy the property and business of the Weston Home Telephone Company.

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Name American Telephone Official for Defense Job

Washington, D. C., July 9 [Special]. —W. H. Harrison vice president and chief engineer of the American Telephone and Telegraph company, today was named by William S. Knudsen, national defense commissioner in charge of production, to the post of director of the construction division. Knudsen said that Harrison's direction of A. T. & T. construction activities in every state gives him "a unique knowledge of the architectural and engineering professions and the building construction industry thruout the country."

Engineers Sought for Government Employment

The United States Civil Service Commission has announced examinations to fill engineering positions in the Government in various specialized fields. Salaries range from $2,600 to $4,600 a year, less a retirement deduction of 3½ percent.

Applications must be filed with the Commission's Washington office not later than August 5 if received from States east of Colorado, and not later than August 8, 1940, if received from Colorado and States westward.

Applicants must have had study in an engineering course in a recognized college, and professional engineering experience in the branch of engineering for which application is made. Optional branches included in the examination are: Electrical, heating and ventilating, materials, mechanical, mining, radio, structural, telegraph, telephone, and welding. Substitution of additional engineering experience may be made for part of the required education; and graduate study in engineering may be accepted for part of the experience. Applicants will not be given a written test, but will be rated on their qualifications as shown in their applications and on corroborative evidence.

Full information as to the requirements for the examinations, and the appropriate application forms, may be obtained from the Secretary of the Board of U. S. Civil Service Examiners, at any first- or second-class post office, or from the U. S. Civil Service Commission, Washington, D. C.

Seeks Indiana Commission Order

The Citizens Telephone Company of Decatur, Ind., recently filed a petition with the Public Service Commission for authority to operate an exchange in Bryant, Jay county, declaring that the present service in Bryant is inadequate.

It set out that 96 residents of Bryant have requested telephone service if the company is granted permission to operate a Bryant exchange.

A petition seeking revocation of the certificate of the People's Telephone Company, which now operates an exchange in Byrant, is pending before the commission. The action was brought by Ralph E. Hanna, public counsellor with the commission, after subscribers complained of poor service.

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Telephone Service Resumed in Dows

Dows, Iowa, June 13—The residents of Dows breathed a sigh of relief yesterday morning when they awoke and found that they were again having telephone service. About two weeks ago the Franklin and Wright Telephone Company discontinued their phone service to the town customers when the mayor informed them they were operating without a franchise and would henceforth have no police protection.

Going back to the horse and buggy days was not approved by the citizens of the town or farmers, and last week a petition was passed around and generally signed asking the telephone company to resume its services, which has been done.

There the matter stands until the next move by the city council is made, and everybody hopes that an agreement will soon be reached so that Dows can again have uninterrupted phone service.

Cords An Important Factor in Telephone Transmission

By
J. DALE WILLIAMS
Vice President and General Manager
Commercial Cord and Supply Company
Clifton Springs, N. Y.

J. Dale Williams

FEW people realize the extent of the development and improvements that have been made during recent years in the quality of cords used in the telephone industry. The improvements have been so gradual that they are just taken for granted. Some manufacturers have taken advantage of these developments and the telephone operating companies have greatly benefited when they acquired cords in which the latest developments were incorporated.

As cords are an important feature in telephone transmission and a major factor in telephone service maintenance cost, they should come in for a good deal of attention. It is easy to be misled by the outward appearance of cords, whereas the most important feature is the conductor within the outer jacket. Of course, it is important that a good quality smooth thread be used over the conductors.

From the solid conductor to the present-day multiple strands, much patient and exhaustive research work has been done, with the result that today we have a conductor that eliminates all possibilities of noisy cords and broken strands. The conductivity of this conductor is maintained at its maximum level, and in fact, is in good working condition when it becomes necessary to remove the cords on account of their being soiled or when the outer cover is worn out.

It may be surprising to learn that during the past 15 years the useful life of the conductor has been increased more than tenfold. When this high grade conductor is properly moistureproofed and covered with the proper number of high quality threads, cords can be and are produced that will give service that will satisfy the most discriminate.

In order to ascertain that the best quality cords that are available are used, it would greatly benefit telephone operating companies to have tests made on all cords used. Following are the tests that should be made: flexibility, conductivity, moistureproof quality,

abrasive test, tensile strength. Old cords should be tested to ascertain whether there is any increase in the conductor resistance. The resistance should not be much over one ohm per six foot length of the single conductor.

Sales Representatives Shift Territories

Three personnel changes in the sales force of the Stromberg-Carlson Telephone Mfg. Co., have been announced by Ralph Barger, telephone sales manager.

W. J. Pfaender, former sales representative in Illinois, was made telephone sales manager of the Stromberg-Carlson Chicago branch. Other changes included the appointment of L. A. Rubindall to cover the Wisconsin district in place of C. H. Knapp who has been transferred to the Illinois area.

Reinke Again Joins "Dodo" Club

Rochester, N. Y., July 8.—Some four years ago, Gene Reinke stepped up to the tee and whammed out a drive that entitled him to join the exclusive fraternity of lucky shots who've made a hole-in-one. Yesterday, during his regular Sunday afternoon match, the Stromberg-Carlson Commercial Sales Manager addressed his ball on the 15th at the Oak Hill course, smacked it nonchalantly, and mailed it directly into the cup.

We are tired of figuring anyone's chances on acing two in a lifetime, but Reinke states it's not chance, but skill; threatens to get another within the same length of time. That grin he's wearing on the 18th hasn't worn off yet.

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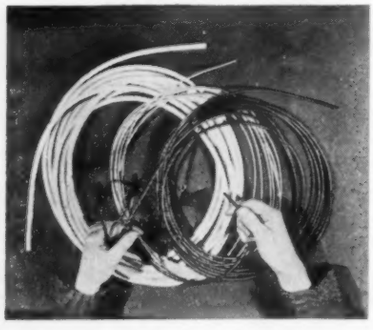

the United States, and shows great improvement over varnished tubular cotton braids under many conditions.

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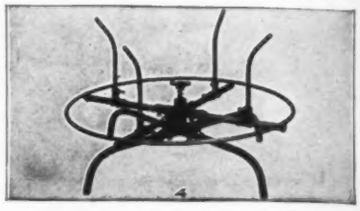

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